[Template:For](/wiki/Template:For" \o "Template:For) [Template:Automatic taxobox](/wiki/Template:Automatic_taxobox) **Tardigrades** ([Template:IPAc-en](/wiki/Template:IPAc-en); also known as **water bears** or **moss piglets**)[[1]](#cite_note-1)[[2]](#cite_note-2)[[3]](#cite_note-3) are water-dwelling, eight-legged, segmented [micro-animals](/wiki/Micro-animal).[[1]](#cite_note-1) They were first discovered by the German pastor [Johann August Ephraim Goeze](/wiki/Johann_August_Ephraim_Goeze) in 1773. The name ***Tardigrada*** (meaning "slow stepper") was given three years later by the Italian biologist [Lazzaro Spallanzani](/wiki/Lazzaro_Spallanzani).[[4]](#cite_note-4) They have been found everywhere from mountaintops to the deep sea, from tropical [rain forests](/wiki/Rain_forests) to the [Antarctic](/wiki/Antarctic).[[5]](#cite_note-5) Tardigrades are notable for being perhaps the most durable of known organisms: they can survive extreme conditions that would be rapidly fatal to nearly all other known life forms. They can withstand temperature ranges from [Template:Convert](/wiki/Template:Convert) to about [Template:Convert](/wiki/Template:Convert),[[6]](#cite_note-6) pressures about six times greater than those found in the deepest ocean trenches, [ionizing radiation](/wiki/Ionizing_radiation) at doses hundreds of times higher than the lethal dose for a human, and the vacuum of outer space.[[7]](#cite_note-7) They can go without food or water for more than 30 years, drying out to the point where they are 3% or less water, only to rehydrate, forage, and reproduce.[[2]](#cite_note-2)[[8]](#cite_note-8)[[9]](#cite_note-9)[[10]](#cite_note-10) They are not considered [extremophilic](/wiki/Extremophilic) because they are not adapted to exploit these conditions. This means that their chances of dying increase the longer they are exposed to the extreme environments,[[4]](#cite_note-4) whereas true [extremophiles](/wiki/Extremophile) thrive in a physically or [geochemically](/wiki/Geochemical) [extreme environment](/wiki/Extreme_environment) that would harm most other organisms.[[2]](#cite_note-2)[[11]](#cite_note-11)[[12]](#cite_note-12) Usually, tardigrades are about [Template:Convert](/wiki/Template:Convert) long when they are fully grown.[[1]](#cite_note-1) They are short and plump with four pairs of legs, each with four to eight claws also known as "disks".[[1]](#cite_note-1) The first three pairs of legs are directed ventrolaterally and are the primary means of locomotion (moving), while the fourth pair is directed posteriorly on the terminal segment of the trunk and is used primarily for grasping the substrate.[[13]](#cite_note-13) Tardigrades are prevalent in [mosses](/wiki/Moss) and [lichens](/wiki/Lichen) and feed on plant cells, algae, and small invertebrates. When collected, they may be viewed under a very low-power microscope, making them accessible to students and amateur scientists.[[14]](#cite_note-14) Tardigrades form the [phylum](/wiki/Phylum) *Tardigrada*, part of the superphylum [Ecdysozoa](/wiki/Ecdysozoa). It is an ancient group, with fossils dating from 530 million years ago, in the [Cambrian](/wiki/Cambrian) period.[[15]](#cite_note-15) About 1,150 species of tardigrades have been described.<ref name=Zhang2011>[Template:Cite journal](/wiki/Template:Cite_journal)</ref>[[16]](#cite_note-16) Tardigrades can be found throughout the world, from the [Himalayas](/wiki/Himalayas)[[17]](#cite_note-17) (above [Template:Convert](/wiki/Template:Convert)), to the [deep sea](/wiki/Deep_sea) (below [Template:Convert](/wiki/Template:Convert)) and from the [polar regions](/wiki/Polar_region) to the [equator](/wiki/Equator).

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## Description[[edit](/index.php?title=(none)&action=edit&section=1)]

[thumb|199px|Johann August Ephraim Goeze](/wiki/File:Johann_August_Ephraim_Goeze1.jpg) [Johann August Ephraim Goeze](/wiki/Johann_August_Ephraim_Goeze) originally named the tardigrade *kleiner Wasserbär* (*Bärtierchen* today), meaning 'little water bear' in German. The name *Tardigrada* means "slow walker" and was given by [Lazzaro Spallanzani](/wiki/Lazzaro_Spallanzani) in 1776.[[18]](#cite_note-18) The name *water bear* comes from the way they walk, reminiscent of a [bear's](/wiki/Bear) [gait](/wiki/Gait). The biggest adults may reach a body length of [Template:Convert](/wiki/Template:Convert), the smallest below 0.1 mm. Newly hatched tardigrades may be smaller than 0.05 mm.

The most convenient place to find tardigrades is on lichens and mosses. Other environments are [dunes](/wiki/Dune), beaches, [soil](/wiki/Soil), and [marine](/wiki/Ocean) or [freshwater](/wiki/Freshwater) sediments, where they may occur quite frequently (up to 25,000 animals per liter). Tardigrades, in the case of *Echiniscoides wyethi*,[[19]](#cite_note-19) may be found on [barnacles](/wiki/Barnacle).<ref name=PBSW>[Template:Cite journal](/wiki/Template:Cite_journal)</ref> Often, tardigrades can be found by soaking a piece of moss in water.[[20]](#cite_note-20)

## Anatomy and morphology[[edit](/index.php?title=(none)&action=edit&section=2)]

[thumbnail|SEM image of *Milnesium tardigradum* in active state](/wiki/File:SEM_image_of_Milnesium_tardigradum_in_active_state_-_journal.pone.0045682.g001-2.png) Tardigrades have barrel-shaped bodies with four pairs of stubby legs. Most range from [Template:Convert](/wiki/Template:Convert) in length, although the largest species may reach [Template:Convert](/wiki/Template:Convert). The body consists of a head, three body [segments](/wiki/Segment_(biology)) with a pair of legs each, and a [caudal](/wiki/Caudal_(anatomical_term)#Anterior_and_posterior) segment with a fourth pair of legs. The legs are without [joints](/wiki/Joint_(anatomy)) while the feet have four to eight claws each. The [cuticle](/wiki/Cuticle) contains [chitin](/wiki/Chitin) and [protein](/wiki/Protein) and is [moulted](/wiki/Ecdysis) periodically.

Tardigrades are [eutelic](/wiki/Eutelic), meaning all adult tardigrades of the same species have the same number of [cells](/wiki/Cell_(biology)). Some species have as many as 40,000 cells in each adult, while others have far fewer.[[21]](#cite_note-21)[[22]](#cite_note-22)[thumb|](/wiki/File:Echiniscus_L.png)[*Echiniscus testudo*](/wiki/Echiniscus_testudo)

The body cavity consists of a [haemocoel](/wiki/Haemocoel), but the only place where a true [coelom](/wiki/Coelom) can be found is around the [gonad](/wiki/Gonad). There are no respiratory organs, with gas exchange able to occur across the whole of the body. Some tardigrades have three tubular glands associated with the rectum; these may be excretory organs similar to the [Malpighian tubules](/wiki/Malpighian_tubule) of [arthropods](/wiki/Arthropod), although the details remain unclear.[[23]](#cite_note-23) The tubular mouth is armed with [stylets](/wiki/Stylet_(anatomy)), which are used to pierce the plant cells, [algae](/wiki/Algae), or small invertebrates on which the tardigrades feed, releasing the body fluids or cell contents. The mouth opens into a triradiate, muscular, sucking [pharynx](/wiki/Pharynx). The stylets are lost when the animal [molts](/wiki/Molting), and a new pair is secreted from a pair of glands that lie on either side of the mouth. The pharynx connects to a short [esophagus](/wiki/Esophagus), and then to an intestine that occupies much of the length of the body, which is the main site of digestion. The intestine opens, via a short rectum, to an [anus](/wiki/Anus) located at the terminal end of the body. Some species only defecate when they molt, leaving the feces behind with the shed cuticle.<ref name=IZ>[Template:Cite book](/wiki/Template:Cite_book)</ref>

The brain includes multiple lobes, mostly consisting of three bilaterally paired clusters of [neurons](/wiki/Neuron).[[24]](#cite_note-24) The brain is attached to a large [ganglion](/wiki/Ganglion) below the esophagus, from which a double [ventral nerve cord](/wiki/Ventral_nervous_system) runs the length of the body. The cord possesses one ganglion per segment, each of which produces lateral nerve fibres that run into the limbs. Many species possess a pair of [rhabdomeric](/wiki/Rhabdomeric) pigment-cup eyes, and there are numerous sensory bristles on the head and body.[[25]](#cite_note-25) Tardigrades all possess a [buccopharyngeal](/wiki/Buccopharyngeal) apparatus, which, along with the claws, is used to differentiate among species.

## Reproduction[[edit](/index.php?title=(none)&action=edit&section=3)]

Although some species are [parthenogenic](/wiki/Parthenogenesis), both males and females are usually present, each with a single [gonad](/wiki/Gonad) located above the intestine. Two ducts run from the testis in males, opening through a single pore in front of the anus. In contrast, females have a single duct opening either just above the anus or directly into the rectum, which thus forms a [cloaca](/wiki/Cloaca).[[23]](#cite_note-23) Tardigrades are [oviparous](/wiki/Oviparous), and fertilization is usually external. Mating occurs during the molt with the eggs being laid inside the shed cuticle of the female and then covered with sperm. A few species have internal fertilization, with mating occurring before the female fully sheds her cuticle. In most cases, the eggs are left inside the shed cuticle to develop, but some species attach them to nearby substrate.[[23]](#cite_note-23) The eggs hatch after no more than 14 days, with the young already possessing their full complement of adult [cells](/wiki/Cell_(biology)). Growth to the adult size therefore occurs by enlargement of the individual cells ([hypertrophy](/wiki/Hypertrophy)), rather than by cell division. Tardigrades may molt up to 12 times.[[23]](#cite_note-23)

## Ecology and life history[[edit](/index.php?title=(none)&action=edit&section=4)]

[Template:Expand section](/wiki/Template:Expand_section) Most tardigrades are [phytophagous](/wiki/Phytophagous) (plant eaters) or [bacteriophagous](/wiki/Wikt:bacteriophagous) (bacteria eaters), but some are [carnivorous](/wiki/Carnivore) to the extent of eating other smaller species of tardigrade (e.g., [*Milnesium tardigradum*](/wiki/Milnesium_tardigradum)).[[26]](#cite_note-26)[[27]](#cite_note-27)

## Physiology[[edit](/index.php?title=(none)&action=edit&section=5)]

Scientists have reported tardigrades in [hot springs](/wiki/Hot_spring), on top of the [Himalayas](/wiki/Himalayas), under layers of solid [ice](/wiki/Ice), and in ocean sediments. Many species can be found in milder environments such as lakes, ponds, and [meadows](/wiki/Meadow), while others can be found in stone walls and roofs. Tardigrades are most common in moist environments, but can stay active wherever they can retain at least some moisture.

[thumb|250px|right|](/wiki/File:Hypsibiusdujardini.jpg)[*Hypsibius dujardini*](/wiki/Hypsibius_dujardini) imaged with a [scanning electron microscope](/wiki/Scanning_electron_microscope)

Tardigrades are one of the few groups of species that are capable of reversibly suspending their [metabolism](/wiki/Metabolism) and going into a state of [cryptobiosis](/wiki/Cryptobiosis). Many species of tardigrade can survive in a dehydrated state for up to five years, or in exceptional cases longer.[[28]](#cite_note-28) Depending on the environment, they may enter this state via [anhydrobiosis](/wiki/Anhydrobiosis), [cryobiosis](/wiki/Cryobiosis), [osmobiosis](/wiki/Osmobiosis), or [anoxybiosis](/wiki/Anoxybiosis). While in this state, their metabolism lowers to less than 0.01% of normal and their water content can drop to 1% of normal.[[7]](#cite_note-7) Their ability to remain desiccated for such a long period is largely dependent on the high levels of the nonreducing sugar [trehalose](/wiki/Trehalose), which protects their [membranes](/wiki/Cell_membrane). In this cryptobiotic state, the tardigrade is known as a tun.[[29]](#cite_note-29) Tardigrades are able to survive in extreme environments that would kill almost any other animal. Extremes at which tardigrades can survive include those of:

* [Temperature](/wiki/Temperature) – tardigrades can survive:
  + A few minutes at 151 °C (304 °F),[[30]](#cite_note-30)\*\* 30 years at −20 °C.[[31]](#cite_note-31)\*\* A few days at −200 °C (−328 °F).[[30]](#cite_note-30)\*\* A few minutes at −272 °C (~1 [K](/wiki/Kelvin), −458 °F)[[32]](#cite_note-32)\* [Pressure](/wiki/Pressure) – they can withstand the extremely low pressure of a [vacuum](/wiki/Vacuum) and also very high pressures, more than 1,200 times [atmospheric pressure](/wiki/Atmospheric_pressure). Tardigrades can survive the vacuum of open space and solar radiation combined for at least 10 days.[[33]](#cite_note-33) Some species can also withstand pressure of 6,000 atmospheres, which is nearly six times the pressure of water in the deepest ocean trench, the [Mariana trench](/wiki/Mariana_trench).[[21]](#cite_note-21)\* [Dehydration](/wiki/Dehydration) – the longest that living tardigrades have been shown to survive in a dry state is nearly 10 years,[[9]](#cite_note-9)[[10]](#cite_note-10) although there is one report of leg movement, not generally considered "survival",[[34]](#cite_note-34) in a 120-year-old specimen from dried moss.[[35]](#cite_note-35) When exposed to extremely low temperatures, their body composition goes from 85% water to only 3%. As water expands upon freezing, dehydration ensures the tardigrades do not get ripped apart by the freezing ice.[[36]](#cite_note-36)\* [Radiation](/wiki/Radiation) – tardigrades can withstand 1,000 times more radiation than other animals,[[37]](#cite_note-37) median lethal doses of 5,000 [Gy](/wiki/Gray_(unit)) (of gamma rays) and 6,200 Gy (of heavy ions) in hydrated animals (5 to 10 Gy could be fatal to a human).[[38]](#cite_note-38) The only explanation found in earlier experiments for this ability was that their lowered water state provides fewer reactants for the [ionizing radiation](/wiki/Ionizing_radiation).[[39]](#cite_note-39) However, subsequent research found that tardigrades, when hydrated, still remain highly resistant to shortwave [UV radiation](/wiki/UV_radiation) in comparison to other animals, and that one factor for this is their ability to efficiently repair damage to their DNA resulting from that exposure.[[40]](#cite_note-40)

Irradiation of tardigrade eggs collected directly from a natural substrate (moss) showed a clear dose-related response, with a steep decline in hatchability at doses up to 4 kGy, above which no eggs hatched.[[41]](#cite_note-41) The eggs were more tolerant to radiation late in development. No eggs irradiated at the early developmental stage hatched, and only one egg at middle stage hatched, while eggs irradiated in the late stage hatched at a rate indistinguishable from controls.[[41]](#cite_note-41)\* [Environmental toxins](/wiki/Toxicant) – tardigrades are reported to undergo chemobiosis, a [cryptobiotic](/wiki/Cryptobiosis) response to high levels of environmental toxins. However, as of 2001, these laboratory results have yet to be verified.[[34]](#cite_note-34)[[35]](#cite_note-35)\* [Outer space](/wiki/Outer_space) – tardigrades are the first known animal to survive in space. In September 2007, dehydrated tardigrades were taken into [low Earth orbit](/wiki/Low_Earth_orbit) on the [FOTON-M3](/wiki/Foton-M) mission carrying the [BIOPAN](/wiki/BIOPAN) astrobiology payload. For 10 days, groups of tardigrades were exposed to the [hard vacuum](/wiki/Hard_vacuum) of outer space, or vacuum and solar [UV](/wiki/UV) radiation.[[2]](#cite_note-2)[[42]](#cite_note-42)[[43]](#cite_note-43) After being rehydrated back on Earth, over 68% of the subjects protected from high-energy UV radiation revived within 30 minutes following rehydration, but subsequent mortality was high; many of these produced viable embryos.[[33]](#cite_note-33)[[44]](#cite_note-44) In contrast, hydrated samples exposed to the combined effect of vacuum and full solar UV radiation had significantly reduced survival, with only three subjects of [*Milnesium tardigradum*](/wiki/Milnesium_tardigradum) surviving.[[33]](#cite_note-33) In May 2011, Italian scientists sent tardigrades on board the International Space Station along with extremophiles on [STS-134](/wiki/STS-134), the final flight of [Template:OV](/wiki/Template:OV).[[45]](#cite_note-45)[[46]](#cite_note-46)[[47]](#cite_note-47) Their conclusion was that microgravity and cosmic radiation "did not significantly affect survival of tardigrades in flight, confirming that tardigrades represent a useful animal for space research."[[48]](#cite_note-48) In November 2011, they were among the organisms to be sent by the U.S.-based [Planetary Society](/wiki/Planetary_Society) on the Russian [Fobos-Grunt](/wiki/Fobos-Grunt) mission's [Living Interplanetary Flight Experiment](/wiki/Living_Interplanetary_Flight_Experiment) to [Phobos](/wiki/Phobos_(moon)); however, the launch failed. It remains unknown whether tardigrade specimens survived the failed launch.

## Taxonomy[[edit](/index.php?title=(none)&action=edit&section=6)]

[Template:See also](/wiki/Template:See_also) [thumb|Illustration of](/wiki/File:Echiniscus_sp.jpg) [*Echiniscus*](/wiki/Echiniscus) sp. from 1861 Scientists have conducted [morphological](/wiki/Morphology_(biology)) and molecular studies to understand how tardigrades relate to other lineages of ecdysozoan animals. Two plausible placements have been proposed: tardigrades are either most closely related to [Arthropoda](/wiki/Arthropoda) ± [Onychophora](/wiki/Onychophora), or tardigrades are most closely related to [nematodes](/wiki/Nematodes). Evidence for the former is a common result of [morphological studies](/wiki/Morphology_(biology)); evidence of the latter is found in some molecular analyses.

The latter hypothesis has been rejected by recent [microRNA](/wiki/MicroRNA) and expressed sequence tag analyses.[[49]](#cite_note-49) Apparently, the grouping of tardigrades with nematodes found in a number of molecular studies is a [long branch attraction](/wiki/Long_branch_attraction) artifact. Within the arthropod group (called panarthropoda and comprising onychophora, tardigrades and euarthropoda), three patterns of relationship are possible: tardigrades sister to [onychophora](/wiki/Onychophora) plus arthropods (the [lobopodia](/wiki/Lobopodia) hypothesis); onychophora sister to tardigrades plus arthropods (the tactopoda hypothesis); and onychophora sister to tardigrades.<ref name=Telford>[Template:Cite journal](/wiki/Template:Cite_journal)</ref> Recent analyses indicate that the panarthropoda group is monophyletic, and that tardigrades are a sister group of Lobopodia, the lineage consisting of [arthropods](/wiki/Arthropod) and [Onychophora](/wiki/Onychophora).<ref name=Cambell>[Template:Cite journal](/wiki/Template:Cite_journal)</ref>[[50]](#cite_note-50)[Template:Clade](/wiki/Template:Clade)

The minute sizes of tardigrades and their membranous integuments make their [fossilization](/wiki/Fossilization) both difficult to detect and highly unusual. The only known fossil specimens are those from mid-[Cambrian](/wiki/Cambrian) deposits in [Siberia](/wiki/Siberia) and a few rare specimens from [Cretaceous](/wiki/Cretaceous) [amber](/wiki/Amber).[[51]](#cite_note-51) The Siberian tardigrade fossils differ from living tardigrades in several ways. They have three pairs of legs rather than four, they have a simplified head morphology, and they have no posterior head appendages. But they share with modern tardigrades their columnar cuticle construction.[[52]](#cite_note-52) Scientists think they represent a stem group of living tardigrades.[[51]](#cite_note-51) Rare specimens in Cretaceous amber have been found in two North American locations. *Milnesium swolenskyi*, from [New Jersey](/wiki/New_Jersey), is the older of the two; its claws and mouthparts are indistinguishable from the living *M. tardigradum*. The other specimens from amber are from western [Canada](/wiki/Canada), some 15–20 million years earlier than *M. swolenskyi*. One of the two specimens from Canada has been given its own genus and family, *Beorn leggi* (the genus named by Cooper after the character [Beorn](/wiki/Beorn) from [*The Hobbit*](/wiki/The_Hobbit) by [J. R. R. Tolkien](/wiki/J._R._R._Tolkien) and the species named after his student William M. Legg); however, it bears a strong resemblance to many living specimens in the family [Hypsibiidae](/wiki/Hypsibiidae).[[51]](#cite_note-51)[[53]](#cite_note-53) [*Aysheaia*](/wiki/Aysheaia) from the middle [Cambrian](/wiki/Cambrian) [Burgess shale](/wiki/Burgess_shale) has been proposed as a sister-taxon to an arthropod-tardigrade clade.[[54]](#cite_note-54) Tardigrades have been proposed to be among the closest living relatives of the [Burgess Shale](/wiki/Burgess_Shale) oddity [*Opabinia*](/wiki/Opabinia).[[55]](#cite_note-55)

## Genomes and genome sequencing[[edit](/index.php?title=(none)&action=edit&section=7)]

Tardigrade [genomes](/wiki/Genomes) vary in size, from about 75 to 800 megabase pairs of DNA.[[56]](#cite_note-56)The genome of *Hypsibius dujardini* has been sequenced.[[57]](#cite_note-57) This genome project debunked a previous claim that this species had 17% [horizontal gene transfer](/wiki/Horizontal_gene_transfer) from other bacteria, fungi and viruses.[[58]](#cite_note-58) *Hypsibius dujardini* has a compact genome and a generation time of about two weeks; it can be cultured indefinitely and cryopreserved.[[59]](#cite_note-59) The genome of *Ramazzottius varieornatus* has been reported to have been sequenced but the results of this effort have not been published or made publicly available.[[60]](#cite_note-60)

## See also[[edit](/index.php?title=(none)&action=edit&section=8)]

* [List of microorganisms tested in outer space](/wiki/List_of_microorganisms_tested_in_outer_space)
* [Living Interplanetary Flight Experiment](/wiki/Living_Interplanetary_Flight_Experiment) – study of selected [microorganisms](/wiki/Microorganism) in [outer space](/wiki/Outer_space)
* [*Mopsechiniscus franciscae*](/wiki/Mopsechiniscus_franciscae) – tardigrade found in [Victoria Land](/wiki/Victoria_Land) Antarctica
* [Extremophile](/wiki/Extremophile)

## References[[edit](/index.php?title=(none)&action=edit&section=9)]

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## External links[[edit](/index.php?title=(none)&action=edit&section=10)]

[Template:Wikispecies](/wiki/Template:Wikispecies) [Template:Commons category](/wiki/Template:Commons_category) [Template:Refbegin](/wiki/Template:Refbegin)

* [Tardigrade water bear](http://www.nytimes.com/2015/09/08/science/the-tardigrade-water-bear.html) [NYTimes](/wiki/NYTimes), 2015
* [Tardigrada Newsletter](http://www.tardigrada.net/)
* [Tardigrades – Pictures and Movies](http://tardigrades.bio.unc.edu/)
* [The Edinburgh Tardigrade project](http://xyala.cap.ed.ac.uk/research/tardigrades/)
* [Instructions for finding tardigrades](http://tardigradehunters.weebly.com/find-tardigrades.html)
* [The incredible water bear!](http://www.microscopy-uk.org.uk/mag/artjun00/mmbearp.html)
* [Tardigrade Reference Center](http://tardigrade.acnatsci.org/)
* [Tardigrades in space](http://tardigradesinspace.blogspot.com/)
* [Tardigrade data and analysis](http://waterbear.bioapps.biozentrum.uni-wuerzburg.de/cgi-bin/main.pl)
* [A short film about tardigrade research from NPR's Science Friday](http://www.sciencefriday.com/video/01/23/2009/behold-the-mighty-water-bear.html)
* [Tardigrada](http://tolweb.org/tree?group=Tardigrada) at the [Tree of Life Web Project](/wiki/Tree_of_Life_Web_Project)
* [Swiss Center of Tardigrade Research – Ecology, Physiology and Evolutionary Biology of Tardigrades](http://www.tardires.ch/)
* [Tardigrade in Moss](http://apod.nasa.gov/apod/ap130306.html)
* [Video (07:54) – First Animal to Survive in Space](http://www.youtube.com/watch?v=7W194GQ6fHI)
* [Video (00:38) – Tardigrade Movement in Water](http://www.youtube.com/watch?v=qF92Ye6wl4A)
* [Tardigrades are so tough, they can survive outer space](http://www.bbc.com/earth/story/20150313-the-toughest-animals-on-earth?ocid=global_bbccom_email_16032015_earth) (March 2015). [*BBC*](/wiki/BBC)
* [The International Society of Tardigrade Hunters](http://tardigradehunters.weebly.com/)

[Template:Refend](/wiki/Template:Refend) [Template:Animalia](/wiki/Template:Animalia) [Template:Extremophile](/wiki/Template:Extremophile) [Template:Taxonbar](/wiki/Template:Taxonbar) [Template:Authority control](/wiki/Template:Authority_control)

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