

## Tardigrades survive impacts of up to 825 meters per second

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SEM image of Milnesium tardigradum in active state. Credit: *PLoS ONE* 7(9): e45682. doi:10.1371/journal.pone.0045682

A pair of researchers at the University of Kent has found that tardigrades are able to survive impacts at speeds of up to 825 meters per second. In



their paper published in the journal *Astrobiology*, Alejandra Traspas and Mark Burchell describe experiments they conducted that involved firing canisters containing tardigrades at high speeds at sand targets.

Tardigrades are tiny eight-legged animals, on the order of 0.1 centimeter in length, of the phylum Tardigrada—they have been given the name "water bear" due to their appearance. Tardigrades have made the news in recent years due to their hardiness. They were the first known animal to survive the rigors of outer space; they are able to go without water for up to 10 years; they can survive extreme pressures and temperatures (including boiling water) and levels of UV radiation that are lethal to most other animals. To achieve these feats, the tiny creatures curl up into a ball and enter a sleep-like state. In this new effort, the researchers wanted to know if they could also survive high-<u>speed</u> impacts.

To find out, the research pair obtained 20 <u>tardigrade</u> specimens and put them in a deep freeze to induce their sleep-like state. They then placed them in groups of two or three into thin cylinders filled with water. The cylinders were then placed inside of a larger cylinder that served as an ammunition shell for a two-stage light gas gun. The gun was placed inside of a <u>vacuum chamber</u> where its shell was fired at a target made of sand. Shots were fired from the gun at different speeds to see what impact each would have on the passenger tardigrades.

The researchers found that the tardigrades shot from the gun at speeds up to 825 meters per second could be resuscitated after removal from the cylinder. Those experiencing higher-speed impacts were torn apart and did not survive.

The researchers suggest that tardigrades would likely not survive an impact with a planet if they traveled across space on an asteroid (as some have suggested), as such impacts tend to be at higher speeds than the tardigrades could tolerate.



**More information:** Alejandra Traspas et al, Tardigrade Survival Limits in High-Speed Impacts—Implications for Panspermia and Collection of Samples from Plumes Emitted by Ice Worlds, *Astrobiology* (2021). DOI: 10.1089/ast.2020.2405

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