Could life have survived a fall to Earth?

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Asteroid impacting Earth's oceans. Credit: NASA/Don Davis

(Phys.org) —It sounds like science fiction, but the theory of panspermia, in which life can naturally transfer between planets, is considered a serious hypothesis by planetary scientists. The suggestion that life did not originate on Earth but came from elsewhere in the universe (for instance, Mars), is one possible variant of panspermia. Planets and moons were heavily bombarded by meteorites when the solar system was young, throwing lots of material back into space. Meteorites made of

Mars rock are occasionally found on Earth to this day, so it is quite plausible that simple life forms like yeasts or bacteria could have been carried on them.

Yet serious questions remain for supporters of this theory. Would even the hardiest life forms be able to survive an impact which ejects the rock into space? Could they live through the freezing temperatures and deadly radiation of space? And could they enter the atmosphere and hit the surface of the Earth without being killed?

New research presented at the European Planetary Science Congress at UCL aims to answer the final question, of whether entry and impact is survivable for simple organisms. Using frozen samples of Nannochloropsis oculata, a type of single-celled ocean-dwelling algae, Dina Pasini (University of Kent) set out to test the conditions which early life would have had to survive if it did indeed travel through space.

Using a two-stage light gas gun, which can accelerate objects up to very high speeds, Pasini fired frozen pellets of Nannochloropsis into water and tested the samples to see if any had survived.

"As you might expect, increasing the speed of impact does increase the proportion of algae that die," Pasini explains, "but even at 6.93 kilometers per second, a small proportion survived. This sort of impact velocity would be what you would expect if a meteorite hit a planet similar to the Earth."

As well as surviving freezing and impacts, like those experienced when rocks are ejected from planets or hit them, there are good reasons to think that the other problems faced by panspermia are not insurmountable either. Ice and rocks can provide protection against radiation, especially if the organism is deeply embedded inside. What is more, heating caused by entry into the atmosphere is unlikely to heat

anything more than a thin layer around the outside of rocks, forming what is known as a 'fusion crust.'

This research suggests that panspermia, while certainly not proven, is not impossible either.

"Our research raises several questions," Pasini says. "If we find life on another planet, will it be truly alien or will it be related to us? And if so, did it spawn us or did we spawn it? We cannot answer these questions just now, but the questions are not as farfetched as one might assume."

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