# Panspermia

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# PANSPERMIA

**Ken Tapping, 17th June, 2014**

Over the last decade or two we have learned that sending a space mission to another planet is not the only way to get rock samples. Those samples also get here all by themselves. When a body such as the Earth or some other planet is hit by a large object, such as a comet or small asteroid, a lot of material is blasted into space where it orbits the Sun until it hits something, like another planet. For example, we have now a growing collection of rock fragments that have come from Mars and landed on Earth as meteorites. The composition of the rock, plus any liquids or gases that might be trapped in it, are a guide as to where it came from.

The frequency with which pieces of one planet get blasted off and then impact another planet have led to a revival of an old idea – panspermia, that life everywhere comes from a common "seed" which is transported from world to world, germinating when conditions are suitable. Of course the journey those seeds would have undertaken are unlike any form of travel we know. For us, travel is, or we would like it to be, sitting in a comfortable seat, gently accelerating to a speed that gets the journey over in a reasonable time, and then gently decelerating to rest, disembarking, and then hoping our luggage made it.

This is very different from being blasted off a planet by a gigantic explosion, imposing an acceleration that would pulverize us. Then, exposed to radiation and probably the vacuum of space, the passengers would orbit the Sun for thousands or millions of years. Any survivors of this process will then have to endure the landing, which involves entering the atmosphere of the destination world at tens of kilometres a second. The outer layers of the rock protecting the passengers would melt and be heated to thousands of degrees, and the deceleration would be almost as violent as it was at "takeoff". The trip would end with a high-speed impact with the ground. What sort of living creatures could possibly survive an ordeal like that? We know for sure that large animals like us could not handle any stage of this method of interplanetary travel.

When in 1969 the astronauts on Apollo 12 visited the lunar lander Surveyor 3, which had been sitting on the Moon's surface since 1967, they removed some components of the lander to take back to Earth. They were surprised to see that Earth bacteria had hitched a ride to the Moon on Surveyor and were still alive. This demonstrated that simple creatures like bacteria can survive for long periods in space, exposed to radiation, vacuum and huge temperature changes. We also now know that bacteria and viruses can survive a wide range of hostile conditions for very long periods by going dormant. However, could they also survive the stresses of takeoff and landing?

To find out, bacterial volunteers were put in holes in small pellets of hard, rock-like material and fired from a special gun into a bowl of sand. So in a fraction of a second they were accelerated to several miles a second and then decelerated just as hard. Many survived that too. So it seems that simple life forms or can be transported from one planet to another on impact fragments.

Stars make all the elements needed for life, and these react in the clouds between the stars to make many chemicals used or needed by living things. This means that many planets forming from this material could be fertile places for life to develop, or provide places for creatures arriving on meteors to survive and thrive. The downside at the moment is that although most of us believe life should be widespread in the universe, we only know of one planet with life present on it. Did that life start here or come from somewhere else?

Jupiter lies very low in the sunset glow, Saturn and Mars lie high in the south and Venus rises about 4 am. The Moon will reach Last Quarter on the 19th.

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