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PANSPERMIA

Ken Tapping, 25th October, 2016

In 1996 scientists found a little piece of Mars on the Antarctic Ice Cap. A meteoric impact on Mars in the remote past had knocked bits of the Red Planet into space, and some of those fragments eventually found their way to Earth. They knew this one was from Mars because of the minerals in it and because it contained bubbles of Mars' atmosphere. Some of the minerals required liquid water to form, and in the Solar System, every planet's atmosphere is unique.

What made this rock particularly interesting is that there were objects in it that might have been fossil bacteria. If this were true, it would be our first real evidence that life exists beyond our world.

Unfortunately, subsequent research on the rock showed those objects could have a non-biological origin, so once more we don't know whether there is life on Mars. We are still trying hard to find out!

We know for sure that large impacts throw fragments of the unlucky planet off into space, where they go into orbit around the Sun and in some cases, fall on other planets. Could living things survive such a trip? It would require being thrown into space by a huge explosion, and then surviving in space for an indefinite period, exposed to vacuum, extreme temperature variations and radiation. Finally they will need to survive the high temperatures and stresses as they dive into the atmosphere of another planet, and the impact with the ground. Obviously humans or other large life forms would not survive this experience, but can smaller creatures such as bacteria?

In 1969 astronauts on Apollo 12 were exploring the Moon, and made a special visit to the spacecraft Surveyor 3, a robot lander that had been sitting on the lunar surface since 1967. They removed some items from the spacecraft and brought them back to Earth, so they could see how our materials and technology had been affected by the hostile lunar environment. Since the Moon has no atmosphere, this environment is the same as that of space.

The scientists got a surprise. Some common Earthly bacteria had hitched a ride to the Moon and had survived two years on the lunar surface. They had not liked it, but they survived. So if bacteria can survive space, could they survive ejection into space by an impact and the equally violent arrival at their destination?

In laboratory experiments, volunteer bacteria were loaded into special bullets and shot into targets at tens of kilometres a second. In a tiny fraction of a second they were accelerated to this speed and decelerated to zero again. Some of them survived.

The possibility that living things might survive being carried from one planet to another raises the issue of how life arises on planets. Is each appearance of life an independent event, or is it, in some cases, the arrival of rather battered immigrants from another world? The idea that life arose in comparatively few places and then spread to other worlds has been around for a long time. It has come to be called "panspermia".

We know that the dust and gas clouds between the stars are loaded with chemicals that are the building blocks of aminoacids, which are key components of proteins, and fundamental to life as we know it. New worlds form from the material in these clouds, so young planets at the right distances from their stars would be sufficiently similar to one another for immigrants to arrive and start the story of evolution on a new world.

About 3.5 billion years ago, Earth and Mars were warm, wet worlds with similar atmospheres. We find traces of life in rocks from that long ago. Did life come here from Mars? Did some of our life go there? Are we Martians?

Mars lies low in the southwest in the evening. Saturn and Venus are very low in the sunset glow. The Moon will be New on the 30th.

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