Meteorites Supplied Earth Life With Phosphorus, Scientists Say

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METEORITES SUPPLIED EARTH LIFE WITH PHOSPHORUS, SCIENTISTS SAY
>From Lori Stiles, UA News Services, 520−621−1877
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University of Arizona scientists have discovered that meteorites, particularly iron meteorites, may have been critical to the evolution of life on Earth.

Their research shows that meteorites easily could have provided more phosphorus than naturally occurs on Earth −− enough phosphorus to give rise to biomolecules which eventually assembled into living, replicating organisms.

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NOTE: See editor's note at end of news release

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Phosphorus is central to life. It forms the backbone of DNA and RNA because it connects these molecules' genetic bases into long chains. It is vital to metabolism because it is linked with life's fundamental fuel, adenosine triphosphate (ATP), the energy that powers growth and movement. And phosphorus is part of living architecture &#65533; it is in the phospholipids that make up cell walls and in the bones of vertebrates.

"In terms of mass, phosphorus is the fifth most important biologic element, after carbon, hydrogen, oxygen, and nitrogen," said Matthew A. Pasek, a doctoral candidate in UA's planetary sciences department and Lunar and Planetary Laboratory.

But where terrestrial life got its phosphorus has been a mystery, he added.

Phosphorus is much rarer in nature than are hydrogen, oxygen, carbon, and nitrogen.

Pasek cites recent studies that show there's approximately one phosphorus atom for every 2.8 million hydrogen atoms in the cosmos, every 49 million hydrogen atoms in the oceans, and every 203 hydrogen atoms in bacteria. Similarly, there's a single phosphorus atom for every 1,400 oxygen atoms in the cosmos, every 25 million oxygen atoms in the oceans, and 72 oxygen atoms in bacteria. The numbers for carbon atoms and nitrogen atoms, respectively, per single phosphorus atom are 680 and 230 in the cosmos, 974 and 633 in the oceans, and 116 and 15 in bacteria.

"Because phosphorus is much rarer in the environment than in life, understanding the behavior of phosphorus on the early Earth gives clues to life's orgin," Pasek said.

The most common terrestrial form of the element is a mineral called apatite. When mixed with