Researcher presents origin-of-life theory for young Earth, supports life on other planets

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Some of the elements necessary to support life on Earth are widely known – oxygen, carbon and water, to name a few. Just as important in the existence of life as any other component is the presence of adenine, an essential organic molecule. Without it, the basic building blocks of life would not come together. Scientists have been trying to find the origin of Earth's adenine and where else it might exist in the solar system. University of Missouri-Columbia researcher Rainer Glaser may have the answer.

Life exists on Earth because of a delicate combination of chemical ingredients. Using a theoretical model, Glaser is hypothesizing the existence of adenine in interstellar dust clouds. Those same clouds may have showered young Earth with adenine as it began cooling billions of years ago, and could potentially hold the key for initiating a similar process on another planet.

"The idea that certain molecules came from space is not outrageous," said Glaser, professor of chemistry in MU's College of Arts and Science. "You can find large molecules in meteorites, including adenine. We know that adenine can be made elsewhere in the solar system, so why should one consider it impossible to make the building blocks somewhere in interstellar dust?"

This theory describing the fusion of early life-forming chemicals is presented in the latest issue of the peer-reviewed journal "Astrobiology" and is co-authored by Brian Hodgen (Creighton University), Dean

Farrelly (University of Manchester) and Elliot McKee (St. Louis University). The paper, "Adenine Synthesis in Interstellar Space: Mechanisms of Prebiotic Pyrimidine-Ring Formation of Monocyclic HCN-Pentamers," describes the absence of a sizeable barrier that would prevent formation of the skeleton needed for adenine synthesis. The article is also featured in the Aug. 6 issue of "Chemical & Engineering News."

Glaser believes astronomers should look for interstellar dust clouds that have highly-concentrated hydrogen cyanide (HCN), which can indicate the presence of adenine. Finding such pockets would narrow the spectrum of where life could exist within the Milky Way galaxy.

"There is a lot of sky with a few areas that have dust clouds. In those dust clouds, a few of them have HCN. A few of those have enough HCN to support the synthesis of the molecules of life. Now, we have to look for the HCN concentrations, and that's where you want to look for adenine," Glaser said. "Chemistry in space and 'normal chemistry' can be very different because the concentrations and energy-exchange processes are different. These features make the study of chemistry in space very exciting and academically challenging; one really must think without prejudice."

Source: University of Missouri-Columbia

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