'Ancestral Eve' crystal may explain origin of life's left-handedness

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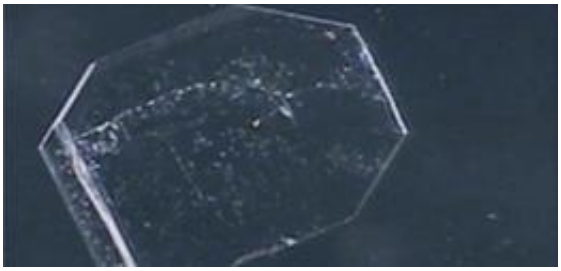

Molecules of aspartic acid with a left-handed orientation, shown in crystal form, could be the "ancestral Eve" of all amino acids -- the building blocks of proteins -- in life on Earth. Credit: American Chemical Society

Scientists are reporting discovery of what may be the "ancestral Eve" crystal that billions of years ago gave life on Earth its curious and exclusive preference for so-called left-handed amino acids. Those building blocks of proteins come in two forms — left- and right-handed — that mirror each other like a pair of hands. Their study, which may help resolve one of the most perplexing mysteries about the origin of life, is in ACS' *Crystal Growth & Design*.

Tu Lee and Yu Kun Lin point out that conditions on the primordial Earth held an equal chance of forming the same amounts of left-handed and right-handed amino acids. Nevertheless, when the first forms of life emerged more than 3 billion years ago, all the amino acids in the proteins had the left-handed configuration. That pattern continued right

up to modern plants and animals.

The scientists used mixtures of both left- and right-handed aspartic acid (an amino acid) in laboratory experiments to see how temperature and other conditions affected formation of crystals of the material. They found that under conditions that could have existed on primitive Earth, left-handed aspartic acid crystals could have formed easily and on a large scale. "The aspartic acid crystal would then truly become a single mother crystal: an ancestral Eve for the whole left-handed population," the article notes.

More information: "The Origin of Life and the Crystallization of Aspartic Acid in Water", *Crystal Growth & Design*

Provided by American Chemical Society