Is It Time To Throw Out 'Primordial Soup' Theory?

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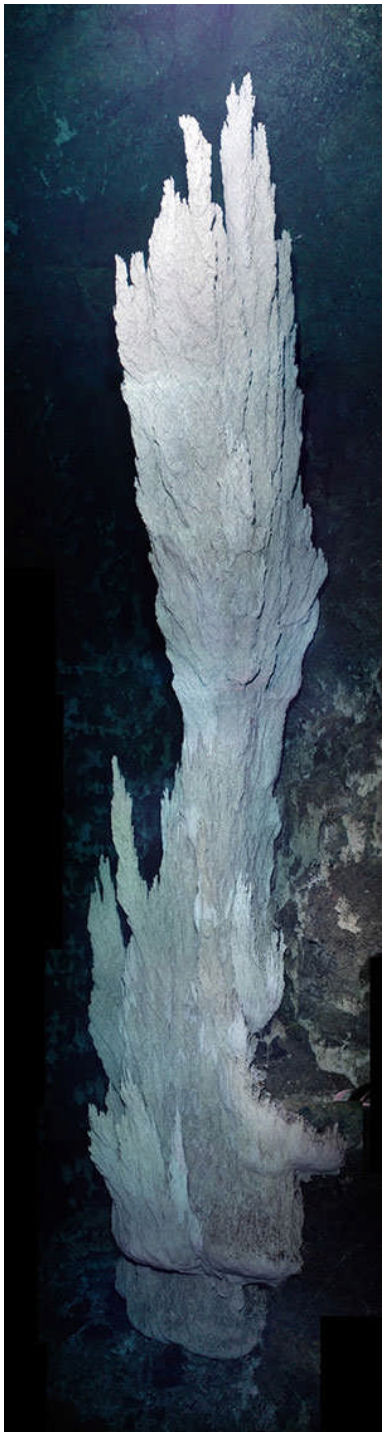
All Things Considered



Deborah Kelley/University of Washington/Oceanographic Society

The "Lost City" vent off the Mid-Atlantic ridge was the first alkaline deep-sea hydrothermal vent discovered. Biochemist Nick Lane believes inorganic cells within these vents provide an ideal setting for the origin of life.

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Is the "primordial soup" theory — the idea that life emerged from a prebiotic broth — past its expiration date?

Biochemist Nick Lane thinks so. The University College London writer and his colleagues argue that the 81-year-old notion just doesn't hold water.

Lane tells NPR's Guy Raz there's another possible explanation for the emergence of life. But before we get to that, why toss out the soup theory?

Lane says the idea of a primordial soup goes back to 1929, and great biologists like J.B.S. Haldane.

"He proposed that the Earth's early atmosphere was composed of simple gases like methane and ammonia. And they would react together under the influence of ultraviolet rays or lightning to produce a thin 'soup' — which became thicker over time — of organic molecules," Lane says.

Those molecules formed amino acids, so the theory goes, which are the building blocks of the proteins from which all life has evolved.

But, Lane says, it turns out that the planet's early atmosphere might not have contained much methane or ammonia after all. Instead of atmospheric gases and lightning, Lane's team proposes that deep-sea, alkaline hydrothermal vents powered life's predecessors.

At these vents, warm fluids percolate up through the ocean floor. When they react to ocean water, they form tiny, inorganic cells. Lane says these cells produce energy the same way that living cells do today: by harnessing chemical gradients across a membrane.

To understand how these gradients work, Lane says to imagine a reservoir behind a dam. "It's the flow of water downhill through the power turbine which is generating electricity. Much the same thing happens in our cells, except instead of having water across a dam, what you actually have in cells is protons," he says.

Lane says the movement of protons drives energy production in all living cells. His argument is that the first cells learned to do this from the honeycomb of tiny chambers found at these deep-sea vents.

"We think that the first cells could not have left these vents unless they'd found a way of tapping into these gradients that were naturally existing there, and then later on learning to generate their own."

He hopes that laboratory scientists will now put the idea to the test.