Novel Center Seeks to Add Spark to Origins of Life

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INSTITUTIONAL PROFILE

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LA JOLLA, CALIFORNIA—For more than 4 decades, a small band of researchers has been trying to explore a question that is about as fundamental as you can get: How did life begin? So far, they have only nibbled at the edges of the topic. Part of the problem is simply the difficulty of peering 4 billion years into the past, which is roughly when life on Earth likely originated. But another, more human, dilemma has held back origin of life studies, too: It isn't really a field. There is no degree in the discipline; although there is an international society, it has all of 300

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NSCORT colleagues are tackling a diverse set of issues, ranging from the chemistry of Earth's early atmosphere, to the notion that life may have been seeded from space, to the conditions that might give rise to robust RNA molecules.

Even without NASA's help, the five principal investigators (PIs)—all chemists of different stripes—would be in the forefront of origin of life studies. In addition to Miller, the group consists of Leslie Orgel at the Salk Institute for Biological Studies, Gustaf Arrhenius and Jeffrey Bada from which are critical to all living things. "[That study] had a tremendously important role in making chemists aware that the whole question of origin of life could be approached by lab experiments," says NSCORT's Arrhenius. "It became an acceptable field."

Yet today, Arrhenius and many other researchers dismiss the experiment itself because they contend that the early atmosphere looked nothing like the Miller-Urey simulation. Basically, Miller and Urey relied on a "reducing" atmosphere, a condition in which molecules are fat with hydrogen atoms. As Miller showed later, he could not make organics in an "oxidizing" atmosphere.

Arrhenius's objection "starts from the observation that Earth now has such a high proportion of water," he says, noting that H_2O is a strong oxidizing agent. "And there's no theory to say the early Earth was deficient in water." Indeed, he believes it had much more water than was simulated in the Miller-Urey experiment. Also, methane and ammonia are