Re: Study Suggests Component of Volcanic Gas May Have Played a Significant Role in the Origins of Life on Earth (Forwarded)

Source: http://sci.tech−archive.net/Archive/sci.astro/2004−10/1268.html

---

From: Jonathan Silverlight (*jsilverlight_at_spam.merseia.fsnet.co.uk.invalid*)
Date: 10/08/04

Date: Fri, 8 Oct 2004 18:39:54 +0100

In message <3Cx9d.32519$jj2.1396447@news20.bellglobal.com>, Andrew Yee <ayee@nova.astro.utoronto.ca> writes

>Scripps Research Institute
>
>For more information contact:
>
>Keith McKeown
>10550 North Torrey Pines Road
>La Jolla, California 92037
>Tel: 858.784.8134
>Fax: 858.784.8118
>kmckeown@scripps.edu
>
>October 7, 2004
>
>Study Suggests Component of Volcanic Gas May Have Played a Significant
>Role in the Origins of Life on Earth
>
>Carbonyl Sulfide Forms Peptide Bonds
>
>La Jolla, CA −− Scientists at The Scripps Research Institute and the
>Salk Institute for Biological Studies are reporting a possible answer
>to a longstanding question in research on the origins of life on Earth
>−− how did the first amino acids form the first peptides?
>
>Peptides and proteins are strings of amino acid building blocks, and
>they are one of the most important classes of biological molecules
>found in living things today. Fifty years of chemical research on the
>origins of life has shown that amino acids could have formed
>spontaneously on the early Earth environment or could have been
>introduced onto the early Earth from meteorites.
>
>"There are lots of ways to make amino acids," says Professor M. Reza
>Ghadiri, Ph.D., who is a member of The Skaggs Institute for Chemical

>Biology at Scripps Research. "But the question is, how do you couple
>them together?"
>
>Ghadiri and Luke Leman, who is a member of the Kellogg School of
>Science and Technology at Scripps Research, worked out one possible
>solution with Leslie Orgel of the Salk Institute. In the latest issue
>of the journal Science, Leman, Ghadiri, and Orgel suggest that the
>missing link is a chemical component of volcanic gas known as carbonyl
>sulfide.
>
>Carbonyl sulfide is present in volcanic gasses and deep sea vent
>emissions today, and since these geological phenomena were prominent
>features on the early Earth, it is reasonable to assume that the gas
>was present.
>
>In their report, the scientists demonstrate that the gas can bring
>about a vigorous chemical reaction that forms peptides under mild
>aqueous conditions. Within a few minutes of introducing the gas to a
>reaction vessel containing amino acids, they observed high yields of
>di−, tri−, and tetra−peptides. They carried out the reaction in the
>presence of air, without air, and with and without other ingredients
>like metal ions, and they found peptides formed readily under all these
>conditions.
>
>"It's really efficient, actually," says Ghadiri. "This addresses a very
>important question that we did not have a real good answer for."
>

snip

>
>One possible approach to the problem of life's origins is to ask the
>question scientifically rather than historically −− how can life
>emerge rather than how did life emerge. In order to address this,
>scientists try to determine experimentally what is chemically feasible
>and what could have occurred on the prebiotic earth.
>
>One possibility, which was suggested in the 1920s by the Russian
>scientist A.I. Oparin, is that life emerged in its most primitive forms
>from minerals, metals, and the elements carbon, hydrogen, oxygen, and
>nitrogen, which were combined into amino acids, nucleotides, and the
>other the building blocks of life under the violent energy of
>lightning, solar radiation, comet impacts, and volcanic events that
>were present.
>
>In 1953, this theory was given a boost when a paper was published in
>Science by Stanley L. Miller, who is Professor Emeritus at the
>University of California, San Diego. In the paper, Miller described an
>experiment he devised with Harold C. Urey −− now called the Miller and
>Urey experiment −− that gave experimental underpinnings to Oparin's ideas.
>

>In the experiment, Miller boiled H2O, CH4,H2, and NH3 gases in a glass
>apparatus containing a pair of tungsten electrodes. He subjected the
>chemicals to an electric discharge, intended to simulate conditions on
>the early Earth, and he collected and analyzed the molecules that
>formed −− which included the amino acids alanine, glycine, and a few
>others. In the years since, several other investigators have expanded
>on the Millerâ€“Urey experiment to demonstrate the formation and
>chemistry of many of the common biological amino acids, sugars, and
>nucleotides. Orgel, who is a long−time investigator in the field, has
>done pioneering research on the prebiotic chemistry of nucleotides.

Getting peptide bonds to form in those conditions is neat, but isn't the CH4/H2/NH3 model of the early atmosphere as dead as yesterday's news? OTOH, what are the chances of a volcano on Titan? Huygens may find something interesting!