

Earth's original ancestor was LUCA, study on origins of life

December 17 2008

Here's another argument against intelligent design. An evolutionary geneticist from the Université de Montréal, together with researchers from the French cities of Lyon and Montpellier, have published a groundbreaking study that characterizes the common ancestor of all life on earth, LUCA (Last Universal Common Ancestor). Their findings, presented in a recent issue of *Nature*, show that the 3.8-billion-year-old organism was not the creature usually imagined.

The study changes ideas of early life on Earth. "It is generally believed that LUCA was a heat-loving or hyperthermophilic organism. A bit like one of those weird organisms living in the hot vents along the continental ridges deep in the oceans today (above 90 degrees Celsius)," says Nicolas Lartillot, the study's co-author and a bio-informatics professor at the Université de Montréal. "However, our data suggests that LUCA was actually sensitive to warmer temperatures and lived in a climate below 50 degrees."

The research team compared genetic information from modern organisms to characterize the ancient ancestor of all life on earth. "Our research is much like studying the etymology of modern languages so as to reveal fundamental things about their evolution," says professor Lartillot. "We identified common genetic traits between animals, plant, bacteria, and used them to create a tree of life with branches representing separate species. These all stemmed from the same trunk – LUCA, the genetic makeup that we then further characterized."

Reconciling conflicting data

The group's findings are an important step towards reconciling conflicting ideas about LUCA. In particular, they are much more compatible with the theory of an early RNA world, where early life on Earth was composed of ribonucleic acid (RNA), rather than deoxyribonucleic acid (DNA).

However, RNA is particularly sensitive to heat and is unlikely to be stable in the hot temperatures of the early Earth. The data of Dr. Lartillot with his collaborators indicate that LUCA found a cooler microclimate to develop, which helps resolve this paradox and shows that environmental micro domains played a critical role in the development of life on Earth.

From RNA to DNA: Proof of evolution

"It is only in a subsequent step that LUCA's descendants discovered the more thermostable DNA molecule, which they independently acquired (presumably from viruses), and used to replace the old and fragile RNA vehicle. This invention allowed them to move away from the small cool microclimate, evolved and diversify into a variety of sophisticated organisms that could tolerate heat," adds Dr. Lartillot.

The article, "Parallel adaptations to high temperatures in the Archaean eon," published in *Nature* (www.nature.com/nature/journal/vaop/ncurrent/full/nature07393.html), was authored by Bastien Boussau (CNRS, Université Lyon), Samuel Blanquart (LIRMM, CNRS: France), Anamaria Necșulea (CNRS, Université Lyon), Nicolas Lartillot (Université Montreal), and Manolo Gouy (CNRS, Université Lyon).

Source: University of Montreal

Citation: Earth's original ancestor was LUCA, study on origins of life (2008, December 17)
retrieved 19 April 2024 from <https://phys.org/news/2008-12-earth-ancestor-luca-life.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.