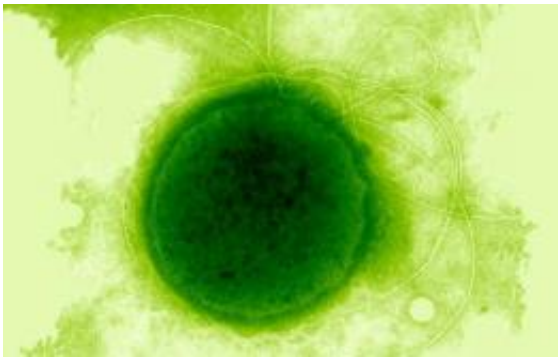
New insight into first life

October 4 2010, by Cath Harris



The Archaea Thermococcus Gammatolerans by Wikimedia/Angels Tapias.

(PhysOrg.com) -- New genome research at Oxford University could change the way scientists view our evolution.

The relationship and emergence of the three 'domains' of life – the three founding branches of the Tree of Life to which all living cells belong – has been much disputed. Two of these domains, Bacteria and Eukaryotes (which includes all animals, plants and fungi) are familiar but less is known of the third: these organisms are collectively called the Archaea.

Some species of Archaea are adapted to live in extremes such as the boiling sulphur springs of Yellowstone National Park or the high salt concentrations of the Dead Sea. Others, such as the group Thaumarchaea, are found in more moderate environments including the warm surface waters of oceans.

Steven Kelly, of Oxford University's Department of Plant Sciences, tracked the evolutionary history of the three domains by analysing more than 3,500 families of genes in the Archaea, Bacteria and Eukaryotes. He and his colleagues found that Eukaryotes are most closely related to the Thaumarchaea.

The study, recently published in *Proceedings of the Royal Society B*, also suggests that the metabolism of the earth's first organisms was based on methane production. 'That's a really important discovery because it gives us a real insight into how life got started, which is one of the biggest questions in evolutionary biology,' Steven said. 'This is a step change in the way people think about how life on earth developed.'

The ability to link advances in our knowledge of evolution to changes in past atmospheric and environmental conditions will enhance our knowledge of how life is adapting to the changing environmental conditions we see today, Steven believes.

This new research suggests that Archaea are as ancient as their name suggests. Evidence from geology and genetics, coupled with the findings, suggests that Eukaryotes evolved between 2 and 2.5 billion years after Archaea, which emerged around 3.5 billion years ago.

Provided by Oxford University

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