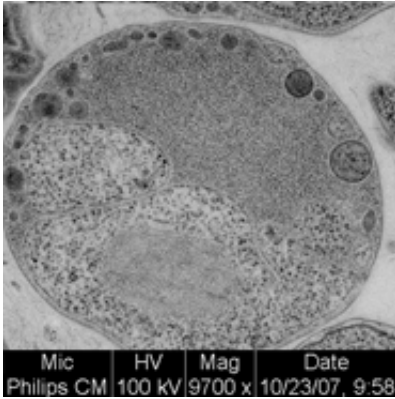


# Sewage water bacteria helps fill 'missing link' in early evolution

7 December 2010



A Planctomycete: a member of the PVC [Planctomycetes, Verrucomicrobiae, Chlamydiae] group of bacteria

(PhysOrg.com) -- A common group of bacteria found in acid bogs and sewage treatment plants has provided scientists with evidence of a 'missing link' in one of the most important steps in the evolution of life on earth - the emergence of cells with a nucleus containing DNA (eukaryotic cells).

For billions of years, [bacteria](#) (single celled organisms without a nucleus) were the only cellular life form on earth. Then, about 1.6 - 2.1 billion years ago, eukaryotic cells emerged. These cells (with a nucleus) heralded the evolution of multi-cellular life on earth including: plants, insects, animals and humans.

Until now scientists have been unable to identify an 'ancestral cell' linking the early prokaryotes with the later eukaryotes, so fusion theory - where two cells merge to form a new cell - is often put forward to explain the appearance of these new cell types.

But new findings by scientists from University College Dublin and the European Molecular Biology Laboratory in Heidelberg, Germany, published in the journal *Science* (26 November

2010), have put paid to the fusion theory explanation, and suggest that an intermediate or 'missing link' cell did exist all those billions of years ago.

"Our discovery means that the appearance of eukaryotic cells on earth can be explained by Darwinian evolution over billions of years rather than a 'big bang' fusion theory," says cell biologist Dr Emmanuel Reynaud, from the UCD School of Biology and Environmental Science, University College Dublin, one of the co-authors of the scientific paper.

"Our analysis shows that PVC [Planctomycetes, Verrucomicrobiae, Chlamydiae] bacteria, members of which are commonly found in today's [sewage treatment plants](#) or acid bogs, represent an intermediate type of cell structure. They are slightly bigger than other known bacteria, and they also divide more slowly."

"The structure of PVC suggests that it is an ancestor of a 'missing link' cell which connected prokaryotic to eukaryotic [cells](#) along an evolutionary path all those billions of years ago," says Dr Damien P Devos, European Molecular Biology Laboratory, Heidelberg, Germany, the other scientist involved in the findings.

**More information:** "Intermediate steps" - Published in *Science* (26 Nov 2010)  
Damien P Devos, European Molecular Biology Laboratory, Heidelberg, Germany; and Emmanuel G Reynaud, UCD School of Biology and Environmental Science, University College Dublin, Ireland.

Provided by University College Dublin

APA citation: Sewage water bacteria helps fill 'missing link' in early evolution (2010, December 7)  
retrieved 23 October 2019 from <https://phys.org/news/2010-12-sewage-bacteria-link-early-evolution.html>

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