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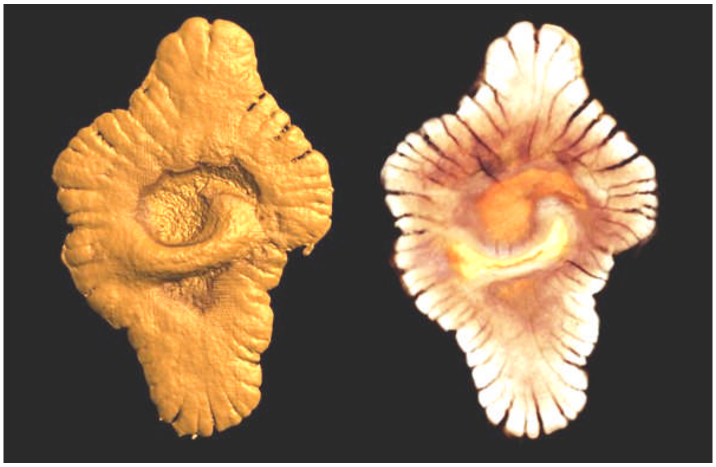
Earliest traces of complex life?



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A virtual reconstruction shows the outer (left) and inner (right) structure of a 2.1 billion-year-old fossil specimen from Gabon.

Alan Boyle writes:Scientists say they've discovered cookie-shaped fossils in Gabon that may represent the earliest-known multicellular life, dating back 2.1 billion years. But when you go that far back, claims about fossilized life get complicated.

For one thing, we're talking about *multicellular* life: The traces of microbial life appear to go even further back in time - to 3.45 billion years ago, based on the way that mats of organic material have built up in ancient sediment. In the multicellular category, the oldest candidate has been a 2 billion-year-old, centimeter-scale, coil-shaped fossil known as Grypania spiralis, which might have been a giant bacterial or algal creature.

The new discoveries, described in today's issue of the journal Nature, show more evidence of structure and measure as large as 12 centimeters (4.7 inches) in size. "On the surface, the fossils resemble irregularly shaped cookies with split edges and a lumpy interior," the researchers, led by Abderrarazak El Albani of the University of Poitiers, report in a news release.

El Albani and his colleagues collected more than 250 fossils from a well-known geological formation in the West African country of Gabon, and put them through rounds of micro-CT scans to chart their 3-D structure. Based on that structure, the researchers deduce that the organisms were built up through cell-to-cell signaling - and not merely deposited together as a microbial mat.

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Many of the fossils found in Gabon measure more than an inch wide.

"The relative complexity of the fossils ... lead El Albani and colleagues to conclude that they are unlike any living bacterium," Philip Donoghue and Jonathan Antcliffe of the University of Bristol write in a Nature commentary on the research. However, Donoghue and Antcliff say additional work will have to be done to confirm that these cookies are more than mere assemblages of one-celled organisms, as well as to verify they were living 2.1 billion years ago rather than during a later age.

The 2.1 billion-year mark is significant because scientists think Earth's atmosphere made a major transition around 2.4 billion years ago. Before that time, there appears to have been no oxygen in the air. Even 2.1 billion years ago, "the atmosphere was still a toxic mix of greenhouse gases, with oxygen making up only a few percent of modern levels," Donoghue and Antcliff note.

"This bacterial world was undergoing the greatest episode of climate change in the history of the planet: pumping out oxygen, drawing down carbon dioxide, slowly transforming the Earth into the world we know," they say.

The bottom line is that these rock-hard cookies could shed light on how life as we generally know it arose from the alien-seeming, one-celled organisms that predated our planet's Great Oxidation Event. But this is still just a tiny piece in a puzzle that will take years of hard work to put together.

In addition to El Albani, the authors of the Nature study, "Large Colonial Organisms With Coordinated Growth in Oxygenated Environments 2.1 Gyr Ago," include Stefan Bengtson, Donald E. Canfield, Andrey Bekker, Roberto Macchiarelli, Arnaud Mazurier, Emma U. Hammarlund, Philippe Boulvais, Jean-Jacques Dupuy, Claude Fontaine, Franz T. Fursich, Francois Gauthier-Lafaye, Philippe Janvier, Emmanuelle Javaux, Frantz Ossa Ossa, Anne-Catherine Pierson-Wickmann, Armelle Riboulleau, Paul Sardini, Daniel Vachard, Martin Whitehouse and Alain Meunier