

Research shows how life might have survived 'snowball Earth'

October 11 2011



Global glaciation likely put a chill on life on Earth hundreds of millions of years ago, but new research indicates that simple life in the form of photosynthetic algae could have survived in a narrow body of water with characteristics similar to today's Red Sea.

"Under those frigid conditions, there are not a lot of places where you would expect [liquid water](#) and light to occur in the same area, and you need both of those things for [photosynthetic algae](#) to survive," said Adam Campbell, a University of Washington doctoral student in Earth and space sciences.

A long, narrow body of water such as the Red Sea, about 6.5 times

longer than it is wide, would create enough physical resistance to advancing glacial ice that the ice sheet likely could not make it all the way to the end of the sea before conditions cause the ice to turn to vapor. That would leave a small expanse of [open water](#) where the algae could survive.

"The initial results have shown pretty well that these kinds of channels could remain relatively free of thick glacial ice during a 'snowball Earth' event," Campbell said.

He examined the issue using an analytical model that applied basic principles of physics to a simple set of [atmospheric conditions](#) believed to have existed at the time. The results were published Saturday (Oct. 8) in [Geophysical Research Letters](#). Co-authors are Edwin Waddington and Stephen Warren, UW professors of Earth and space sciences.

Many scientists believe Earth became a giant snowball two or three times between 800 million and 550 million years ago, with each episode lasting about 10 million years. These all preceded the [Cambrian explosion](#) about 530 million years ago, when [life on Earth](#) rapidly expanded, diversified and became more complex.

But simple photosynthetic plankton turn up in the [fossil record](#) before and after the "snowball Earth" events, leading scientists to wonder how that could happen if Earth's oceans were completely encased in ice.

Campbell said it is assumed the algae survived these episodes, "unless they re-evolved each time, which creates a whole different problem for evolutionary biology."

He chose the Red Sea as an example because it is formed from a tectonic process called continental rifting, a process known to have existed at the time of the snowball Earth events, and it lies in an arid

region between Egypt and the Arabian Peninsula.

Campbell noted that in a [snowball Earth](#) event, the open water in such a sea wouldn't have lasted long if it didn't have a way of being replenished – if, for example, the glacial ice acted as a dam and cut off the influx of additional sea water. The open water had to exist on the order of 10 million years for the algae to survive.

"Over 10 million years, you could evaporate the deepest lake in the world," Campbell said. "If you're in a desert, you'd have to have a supply of sea water."

More information: The paper is available at www.agu.org/journals/gl/gl1119/2011GL048846

Provided by University of Washington

Citation: Research shows how life might have survived 'snowball Earth' (2011, October 11)
retrieved 20 March 2024 from <https://phys.org/news/2011-10-life-survived-snowball-earth.html>

<p>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.</p>
--