

# Qualia

## Buried under the ice, ancient microbial life

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This close up of the edge of the Ross Ice Shelf shows how thick the ice entrapping Lake Vida is (Image: Michael Van Woert, NOAA NESDIS, ORA)

Lake Vida is a frozen Antarctic lake, encapsulated in ice at least 20 meters (65 feet) thick. Beneath the ice lies super salty brine — at about six times saltier than average ocean water, it prevents the water from freezing, even as its temperature reaches -13 degrees Celsius (8 degrees Fahrenheit). The ice is so thick that it has effectively isolated the briny depths from the surface for at least 2,800 years. Despite these harsh conditions, life has found a way. Researchers, [reporting in the Nov. 26 issue of \*Proceedings of the National Academy of Sciences\*](#), say the brine is teeming with a diverse microbial community.

During expeditions in 2005 and 2010, researchers drilled through the ice and retrieved samples of the water below. They found scores of unique, metabolically active bacteria. And any bacteria that could survive in Lake Vida would have to be unique. Further analyses revealed the brine was completely depleted of oxygen and mildly acidic. It had high levels of carbon-based compounds, as well as high levels of reactive chemicals such as nitrous oxide and molecular hydrogen. The overall chemistry of the Lake led researchers to conclude that chemical reactions between the brine and the underlying sediment were generating and replenishing these reactive chemicals. Having been isolated for millenia from external sources of energy, the microbes appear to be generating their own energy in the form of molecular hydrogen. Molecular hydrogen is known to support other bacterial life deep underground in gold mines, and might serve as fuel source in the icy brine of Lake Vida.

The findings push the boundaries of the extreme limits at which life can survive not just on Earth, but possibly on alien worlds, as well. Astrobiologists study extreme, isolated environments like Lake Vida as analogs for icy moons with the potential to harbor life (Europa and Enceladus are two such candidates). Learning how life can thrive encapsulated under the Antarctic ice may shed light on what secrets other icy worlds hold.

## Related Links:

- [Microbial life at  \$-13\$  °C in the brine of an ice-sealed Antarctic lake](#) in *PNAS*
- Also check out our In Depth article about [what it is like to search for life in Antarctica with AAAS Fellow John Prisco](#)