

The Deep, Hot Biosphere

In the past 25 years, since it was first proposed by Thomas Gold, exploration of the microbial community in the Earth's subsurface has yielded insights into the limits of life.

- The concept of a deep, hot biosphere, microbial life living on the energy from chemical reactions in the subsurface down many kilometers until the temperature was too high, challenged the existing paradigm of the origin and evolution of life.
- Study of this community has shown that they grow on compounds produced by water-rock reactions at depth and are chemically independent of the sunlight-powered surface biosphere.
- The microorganisms in the deep biosphere are genetically distinct

These zinc sulfide spheres were created by rock-eating bacteria in an abandoned mine.



from their cousins in surface communities – including many more members of the archaea – and have distinct metabolic capabilities.

- One of the major questions currently being examined in these communities is whether the microorganisms here are endemic, or whether they have adapted only from locally-sourced, closely related to surface organisms.
- Study of this deep, hot biosphere continues to broaden our understanding of life in extreme environments, and expand our boundaries for searching for life on other planets.



In hot springs, like Grand Prismatic in Yellowstone National Park, microorganisms very similar to those from the subsurface can be studied in extreme surface environments.