

# Study Suggests Titan May Hold Keys For Exotic Brand Of Life

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Saturn's moon Titan has long been a place of interest to astrobiologists, primarily because of its apparent similarities to the early Earth at the time life first started. A thick atmosphere composed primarily of nitrogen and abundant organic molecules (the ingredients of life as we know it) are among the important similarities between these two otherwise dissimilar planetary bodies.

Scientists have considered it very unlikely that Titan hosts life today, primarily because it is so cold (-289 degrees Fahrenheit, or -178 Celsius) that the chemical reactions necessary for life would proceed too slowly. Yet previously published data, along with new discoveries about extreme organisms on Earth, raise the prospect that some habitable locales may indeed exist on Titan.

In a paper being presented at the Division for Planetary Sciences 2005 Meeting this week, a team of researchers from Southwest Research Institute (SwRI) and Washington State University say that several key requirements for life now appear to be present on Titan, including liquid reservoirs, organic molecules and ample energy sources.

Methane clouds and surface characteristics strongly imply the presence of an active global methane cycle analogous to Earth's hydrological cycle. It is unknown whether life can exist in liquid methane, although some such chemical schemes have been postulated. Further, abundant hints of ice volcanism suggest that reservoirs of liquid water mixed with ammonia may exist close to the surface.

"One promising location for habitability may be hot springs in contact with hydrocarbon reservoirs," says lead author David H. Grinspoon, a staff scientist in the SwRI Space Science and Engineering Division. "There is no shortage of energy sources [food] because energy-rich hydrocarbons are constantly being manufactured in the upper atmosphere, by the action of sunlight on methane, and falling to the surface."

In particular, the team suggests that acetylene, which is abundant, could be used by organisms, in reaction with hydrogen gas, to release vast amounts of energy that could be used to power metabolism. Such a biosphere would be, at least indirectly, solar-powered.

"The energy released could even be used by organisms to heat their surroundings, helping them to create their own liquid environments," says Grinspoon. "In environments that are energy-rich but liquid-poor, like the near-surface of Titan, natural selection may favor organisms that use their metabolic heat to melt their own watering holes."

The team says these ideas are quite speculative but useful in that they force researchers to question the definition and universal needs of life, and to consider the possibility that life might evolve in very different environments.

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