

# Planetary Sciences: Exobiological Analysis of Titan and Mars

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## Abstract:

Methane, a vital precursor of life, was detected in excess of 250 ppbv on Mars in 2004, whereas Nitrogen and methane had already been discovered on Titan (Saturn's moon). The origin of methane on Mars and Titan has been associated with biological and tectonical or cosmological sources. Hydrochemical and microbial sources were also considered possible. Cassini-Huygens mission concluded that methane was most likely formed on Titan rather than having any other cosmological origin. The presence of methane on Titan is as inexplicable as it is on Mars. A plausible source is serpentinization at relatively low temperatures. Also, optical and radar images confirm the occurrence of cryovolcanism which is geyser like eruptions of ammonia water ice indicating intense subtectonic movements on Titan. Acetylene and hydrogen could serve as nutrients for methanogens even in the extreme cold of Titan's surface (-179 Celsius). However an explanation for methane is much less attractive on Titan than on Mars. Underground water ammonia brine on Mars would be a friendly environment for living organisms. Since the inorganic isotope ratio of Titan is different from that on Earth, it implies life could have evolved differently on Titan than on Earth. The only negative aspect is the presence of hydrogen peroxide generated from strong static electric fields. Being a potent antiseptic it would quickly sterilize the surface and scrub out the organics.

Keywords: Methanogens, Cassini-Huygens mission.

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