

Did (Does) Life Exist Elsewhere in the Solar System?

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The stage for life was set billions of years ago and we are on the verge of knowing what happened to its characters. Two convergent lines of evidence raise expectations that biological systems could occur beyond the confines of earth. The first is the detection of microbial life forms in terrestrial environments that may be similar to those on other solar system bodies. The second is NASA's spectacular discoveries of significant water reservoirs on Mars and Europa, and evidence of liquid organic environments on other solar system bodies such as Titan. IF we discover evidence of past or present life beyond earth, the next challenge will be to determine whether it originated and evolved independent of terrestrial-based life. The competing hypothesis is life elsewhere in the solar system shares a common ancestry with microbial life-forms that dominate Earth's biology. Natural influx / efflux mechanisms may have mediated the widespread cross-contamination of microbes in our solar system. Through the development of very sophisticated in situ instrumentation or return of viable samples, it may be possible to employ molecular technology to differentiate between these scenarios. This task will impose stringent constraints on planetary protection and emphasizes the importance of fully accounting for the diversity of microbial life on Earth.