

# Ice on Jupiter moon may shelter life, 2 say

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SAN FRANCISCO — Primitive life may lurk beneath the ice of an incredibly cold moon of Jupiter, say two space agency scientists who stressed that the possibility is extremely remote.

Although Ray Reynolds says the possibility that life might have evolved on Europa is a long shot, he believes that hardy organisms could survive in small, temporary oases on the moon's ice-covered oceans.

"It's someplace else to look, but I wouldn't say the probabilities are very high," Reynolds said before co-worker Steven Squyres described their work Monday at the American Geophysical Union meeting in San Francisco. Both work at the National Aeronautics and Space Administration's Ames Research Center at Mountain View, Calif.

"It would also be worthwhile to see what's there in the oceans," Reynolds said. "There could be the same kind of primitive goop that produced life on Earth."

Reynolds said their theories about Europa, based primarily on the results of photographs sent to Earth by Voyager spacecraft in 1979 and 1980, will be published in the British journal *Nature*.

Europa, almost as large as Earth's moon, is covered by a

smooth layer of ice from which craters have been erased. Lines crisscross the ice, apparently representing miles-wide fractures resulting from tidal forces as Jupiter's immense gravity tugs on the moon.

Scientists generally believe the ice surface of Europa is only a few miles thick and covers an ocean perhaps 30 miles deep. The water would be kept from freezing by heat produced through the tidal forces.

The key conclusion of Reynolds and Squyres is that within the large fractures are cracks too small to be seen by spacecraft cameras. When the cracks are torn open, water sprays out to freeze and sprinkle the surface with a frothy layer of snow that could act as an insulator to keep heat from escaping the ocean.

For liquid water to exist, temperature and pressure must be within survival range for primitive life, Reynolds said.

"These (oases) are very, very tiny regions, and they're very limited in time," each lasting only three or four years, Reynolds said. "But that they exist at all on this crazy world way out in the solar system with surface temperatures of 100 degrees Kelvin (about 280 degrees below zero Fahrenheit) is just amazing."