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# NASA FUNDS SCRIPPS INSTRUMENT FOR PROBING FOR LIFE ON MARS

*Detector to hunt for organic molecules during proposed 2013 mission*

On Monday, NASA announced $750,000 in funding for development of an instrument to detect signs of life on Mars proposed by a scientist at Scripps Institution of Oceanography at UC San Diego.

The instrument is designed to provide the most rigorous analysis possible for the past and present existence of biological compounds on Mars' surface, according to Jeffrey Bada, at professor at Scripps and lead investigator on the project team. Other principal scientists are Richard Mathies of UC Berkeley and Frank Grunthaner of NASA's Jet Propulsion Laboratory in Pasadena as well as researchers at NASA's Ames Research Center in Menlo Park and the Leiden Institute of Chemistry in the Netherlands.

Named after the late Nobel Laureate and UC San Diego scholar Harold C. Urey, the Urey Mars Organic and Oxidant Detector will perform the first search for key classes of organic molecules in the Martian environment using state-of-the-art analytical methods at part-per-trillion sensitivities. The Viking landers in the 1970s unsuccessfully tested for organic molecules on Mars, but their sensitivity was so low that they would have failed to detect life even if there were a million bacteria per gram of soil.

“Urey will able to detect key molecules associated with life at a sensitivity roughly a million times greater than previous instrumentation,” said Bada, a professor of marine chemistry and director of the NASA Specialized Center of Research and Training in Exobiology at Scripps. “It will be the first instrument to have the capacity to detect amino acids, along with other possible biomolecules, and determine their origin on another planet.”

Urey has been selected for the European Space Agency’s ExoMars rover mission, a Mars exploration mission scheduled for launch in 2013 that will focus on exobiology, the science of life in space and on other planets. ExoMars will include a highly mobile rover with a drill capable of extracting soil samples two meters below the Mars surface.

A compact instrument that you can hold in your hand, Urey will search for trace levels of organic molecules, such as amino acids and some of the components of DNA and RNA, by heating and analyzing spoon-sized amounts of Martian soil. The molecules released from the heating are condensed on a trap cooled to Mars’ night time temperature, and then probed with a laser.

If amino acids are detected, the microfabricated capillary electrophoresis or μCE instrument developed at Berkeley examines the amino acid composition and chirality, or “handedness,” of the molecules to determine whether they come from biological sources. Non-biological amino acids contain nearly equal amounts of left- and right-handed forms, while those from organic matter exhibit excessive amounts of one hand or the other. Amino acids on Earth use only left-handed amino acids.

“Testing for chirality provides an unambiguous way of detecting life,” said Bada. “So if we see a significant excess of right-handed amino acids, the only conclusion that’s possible is: Eureka! We’ve detected unique Martian life that’s not related to Earth life whatsoever.”

Bada indicated that digging deep into the Martian soil is vital to the mission since ultraviolet and cosmic radiation have likely eliminated any potential indications of life on the planet’s surface.

“Humans are incredibly intrigued about the possibility of life beyond Earth,” said Bada. “We’re at a moment in time when we are going to be addressing this issue in the most robust way that’s ever been attempted. I think it is extra-ordinarily interesting that if we do detect life on Mars, it not only provides us with an opportunity to try and understand how life began on that planet, but also will help us understand how life began on our own planet.”

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**Scripps Institution of Oceanography: scripps.ucsd.edu**

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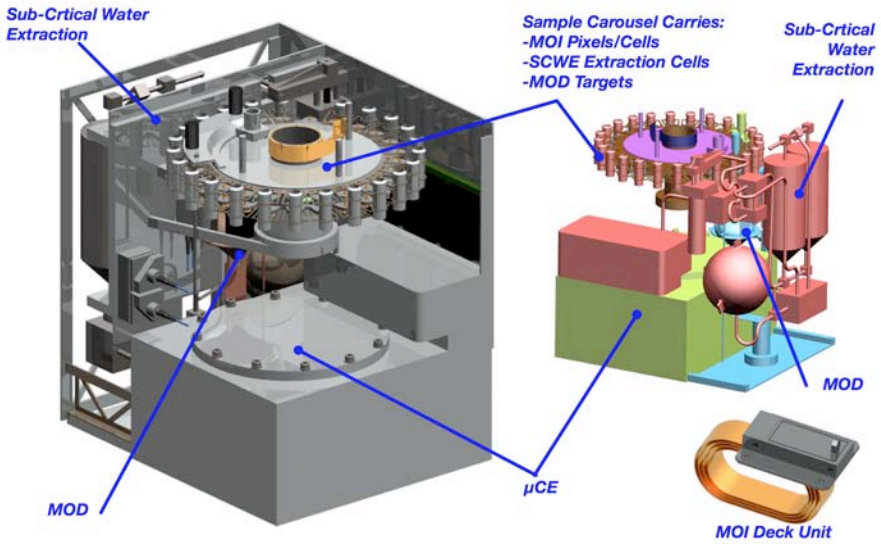
Scripps Institution of Oceanography, at UC San Diego, is one of the oldest, largest and most important centers for global science research and graduate training in the world. The National Research Council has ranked Scripps first in faculty quality among oceanography programs nationwide. Now in its second century of discovery, the scientific scope of the institution has grown to include biological, physical, chemical, geological, geophysical and atmospheric studies of the earth as a system. Hundreds of research programs covering a wide range of scientific areas are under way today in 65 countries. The institution has a staff of about 1,300, and annual expenditures of approximately $140 million from federal, state and private sources. Scripps operates one of the largest U.S. academic fleets with four oceanographic research ships and one research platform for worldwide exploration.



*Elements of the Urey instrument include the Mars Oxidant Instrument (MOI), the Mars Organic Detector (MOD), the MicroCapillary Electrophoresis Instrument and the Sub-critical Water Extractor (SCWE).*