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NASA Funds UCSB Researcher to Develop Instrument to Search for Past Life on Mars

University of California, Santa Barbara organic chemist Luann Becker will receive a grant of $750,000 from NASA to further develop the Mars Organic Molecule Analyzer (MOMA), an instrument that will search for the past remnants of life on Mars. The instrument will probe subsurface soil samples taken as far as two meters below the surface of Mars. The project will be included in a European space mission.

The European Space Agency's (ESA) Aurora Program was approved in December 2005. Following the announcement by ESA, Becker submitted a NASA Mission of Opportunity proposal in support of her team's instrument, MOMA. The instrument is a mass spectrometer that will search for the chemical traces of life and is one of a suite of ten instruments in the ExoMars "Pasteur" payload, scheduled to arrive on Mars in 2013.

Becker is the principal investigator of a team that includes many French and German scientists as well as two co-investigators from the Johns Hopkins University in Baltimore. The American co-investigators are: William B. Brinckerhoff from the Applied Physics Laboratory and Robert J. Cotter of the Johns Hopkins School of Medicine's Department of Pharmacology and Molecular Sciences where the instrument will be developed.

ExoMars is Aurora's first Martian robotic exploration mission and is scheduled to be launched from Kourou, French Guiana. The ExoMars mission will deploy a highly mobile rover with a drill and the Pasteur payload that will analyze the Martian drill samples. ExoMars will provide the first subsurface vertical profile, and will reach down to two meters below the Martian surface. By drilling deep in to the subsurface, the ExoMars scientists hope to find evidence of water and past life that may have been erased from soil and rocks at the surface of Mars due to the very harsh environment that exists today.

The other lead American scientist who is developing a separate U.S. organic detection instrument on the Exomars mission is Jeffrey L. Bada, Becker's former Ph.D. advisor and professor at the Scripps Institute of Oceanography, University of California, San Diego. His NASA funding was also approved. "It is highly unusual for a professor and his former graduate student to have separate instruments on the same Mars mission," said Bada. Becker agreed, noting that her successful proposal is a tribute to Bada's scientific mentorship.

Recent evidence of past water on the surface of Mars provided by the two NASA MER rovers -- that are still operating after three years on Mars -- has spurred interest in developing different, new, and highly sensitive instruments to search for present or past life on Mars.

"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 extraordinarily 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."

Becker, trained as an oceanographer and organic geochemist, is deeply involved in the study of the origin, evolution, and distribution of life in the universe, a field known as astrobiology. She was also involved in the study of organics in the Martian meteorite Allan Hills 84001. That meteorite revived interest in the search for life beyond the Earth and the current NASA and ESA Mars exploration programs. Some two dozen meteorites collected on Earth have been determined to be of Martian origin because noble gases, trapped in "glass" within the rock, match the composition of the Martian atmosphere first measured by the NASA Viking Landers in 1976.

The opportunity to work with the Europeans makes the project especially appealing to Becker. "The Europeans are coming together to support this mission," said Becker. "U.S. support is also required. It's a very, very unique opportunity. We all have a unified goal."

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