

## Press on 2010 Astrobio Conference

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*The moons would also house life:*

**In five years the astronomers could find a new Earth – “Recent advances in the search for planets outside our Solar System” is the topic of discussion for a group of scientists meeting in Santiago**

Lorena Guzmán H. and Richard Garcia

In the mid-nineties when a group of astronomers embarked on the search for planets outside the solar system, his colleagues looked at them with suspicion. Fifteen years later, with more than 400 new worlds already identified with telescopes operating in Chile, this research has attracted the attention not only of the entire astronomical community, but also of geologists and biologists, who have found that their work is no longer simply confined to planet Earth. A select group of them gather today in the building of the *ECLAC 2010 ASTROBIO* international seminar where they share the latest of this search for a target planet that hosts some kind of life.

"Most of the exoplanets are known as giant Jupiter and very hot," says Lisa Kaltenegger, an astronomer at Harvard. Most have no possibility of hosting some kind of life. And the Earth-like planets are too small to be observable.

*[Figure caption – REQUIREMENTS: Astronomer Lisa Kaltenegger says that it is not enough that a planet like that in the picture has an atmosphere to host life. It is also important that the water is in liquid condition and its surface is not too hot.]*

### **No little green men**

But that will change. In 2014 NASA plans to launch the James Webb space telescope. With this and the new generation of telescopes, astronomers can see these planets as they pass in front of its star. Advanced instrumentation also provides information about the radiation emitted from these planets. Thanks to this special spectroscopic capability, the ESO VLT at Cerro Paranal found one of these distant worlds this week.

Analyses of the planetary spectra show the presence of various chemical species that are indicators of possible living organisms. "We have found water on Mars and on the Moon," says Geronimo Villanueva, expert at NASA's Goddard Center for Astrobiology.

This is just the beginning. "First we have to verify if the planet we found is of the right size and the location of the Sun. The second challenge will be to determine the composition of the planetary atmosphere, oxygen or methane. We have oxygen on Earth now, but did our planet have it in its past? What was the biology at the time? The question then is what is the condition for life. All this will take many years because it is a very difficult topic," he acknowledges.

And Kaltenegger expands the search field to the moons: "Now, a group estimated that the giant planets, unfit for life, could have moons the size of the Earth who do have the conditions," he says.

Michael Mumma, Director of the Goddard Center for Astrobiology, clarifies that they are definitely not little green men we are looking for. "More than 3.5 billion years ago the only life on Earth were microbes. And most likely we find the same thing there," he says.

His team has discovered several areas on Mars with methane releases. "This could be caused by a biological source, such as bacteria, or geologic activity," he explains. They still have no clues as to which of the two it is and if it has any connection to the water found on Mars. A probe is proposed for 2016 to identify the gases on Mars and to determine whether they are produced by something living. "It is essential to determine where there is life on Mars, if any, before sending men to these areas. The astronauts who walked on the Martian soil could contaminate this life and in turn bring it to Earth with potentially dangerous consequences," he adds.

## **Search**

Changes in the intensity of starlight by the passage of a planet before it or gravitational disturbances are the most common methods to detect extrasolar planets. Here are some recent thoughts on the search.

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"I am fascinated by the idea of what the Earth is like when older or younger, and if we are unique, and I do not think we are."

*LISA Kaltenegger*

*Astronomer, Harvard University.*

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"We need to know where there might be life, because man should not go there because of possible contamination on both sides."

*Michael Mumma*

*Director of Goddard Center for Astrobiology*

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"Astronomers look for planets, biologists study what might live there and what chemical reactions occur. Each is necessary to have a general picture of the process."

*Geronimo Villanueva*

*Astronomer, Goddard Center for Astrobiology*

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## **In the driest place in the world**

Rafael Vicuña, a biologist at the Catholic University, is leading the search for life in the best laboratory we have similar to Mars on Earth: the Atacama Desert.

The hope is to find organisms that can live in extreme environments here on Earth, then we know what to look for in exoplanets," says the scientist.

In this search, his team has found a special type of bacteria that lives below the quartz stones in the desert. "Under those rocks, radiation is only 1 or 2% of what's up at the surface, and that is sufficient for these organisms to start photosynthesis," he says. And they have special chemicals that attract the little water that condenses on the stone.

They have also found on a 15 or 20 inches of the surface special pigment-producing microorganisms, which can absorb the little sunlight that reaches them. "Much remains to be studied", he says. "We just started to characterize the stromatolites of the Salar de Llamará and the bacterial communities that formed the minerals. All this knowledge will serve to define what kind of future instruments and probe will be designed to search for extraterrestrial life.