

The Home Forum.

Hello? Anybody out there?

IT MAY NOT BE 'ANYBODY' – MORE LIKE 'ANY SLIME.' STILL, SCIENTISTS ARE HOPEFUL ABOUT A JOVIAN MOON.

IF THERE'S WATER, IS THERE LIFE? Earth is a 'water world' from space, and humans have observed Mars' polar ice caps (top and bottom white patches, below) for centuries. But Jupiter's moon Europa has more water than all Earth's oceans.



ON EARTH, SCIENTISTS have found organisms living in some pretty weird places.

Microscopic creatures, often living in communities that form slimy mats, have turned up deep under the ocean, where no light shines. Microbes have been discovered in cold, salty, ice-covered lakes in Antarctica. They're also in very hot, acidic water in Yellowstone National Park. (See **Kidspace for May 6, page 18.**) One type of microbe is so hardy it can survive heavy doses of radiation. (It was found in 1956 in a can of rotten meat that had been zapped to keep it from spoiling.)

Their homes may vary, but all these organisms need one vital ingredient: water. So if you're looking for life in another part of the solar system, where would you go? Mars? Maybe. It has ice caps – frozen water.

And data from robotic spacecraft orbiting Mars suggest that it may have ice beneath its dusty, rusty surface.

But ask Ron Greeley where he'd look, and he'll tell you he'd pick Jupiter's moon Europa any day.

"Europa has more water than all of Earth's oceans combined," says Dr. Greeley. "That's a lot of water!" Especially since Europa is only 1/4th as big as Earth. Greeley studies the geology of other planets at Arizona State University in Tempe.

Greeley and colleague Torrence Johnson at the California Institute of Technology's Jet Propulsion Laboratory (JPL) in Pasadena, Calif., are leading a team of scientists planning a mission to Europa and three other large moons of Jupiter. If all goes well, they will launch a large robotic spacecraft called the Jupiter Icy Moon Orbiter (JIMO) in 2011. Ultimately, scientists want to send special "cryobots" to Europa to try to penetrate its icy cover.

But first they have to get a better idea of how Europa is put together. Three previous spacecraft – two Voyager probes and Galileo – have visited Jupiter and its moons. The Voyagers, launched in 1977, gave scientists their first close-up views of Europa. But the two craft just flew by on their way to other planets.

In 1989, scientists launched Galileo, which spent all its time examining Jupiter and its moons. It ends its trip in September, when it will crash into the planet.

Those missions, and especially Galileo, sent

back amazing images of Europa. Its surface is laced with long cracks, ridges, and other evidence that the ice has been shifting. That suggests the ice is riding atop slushy ice or liquid water.

"The crust is extremely disturbed," Greeley says, "with dark stuff concentrated around the cracks and ridges." The "dark stuff" appears to be material brought up from underneath. (On Earth, hot magma rises from deep inside and cools to form new crust along deep-ocean ridges.) Unlike other moons of Jupiter, Europa's surface is nearly crater-free. This suggests that the crust has been jumbled and refreshed by material welling up from underneath during the moon's "recent" past – 30 million years or so.

As if to further tantalize Greeley and other Europa fans, three years ago a team of scientists reported that Europa's magnetic field shifted in ways that could best be explained by the movement of salty slush or water under the ice.

But Greeley cautions that scientists still don't know how thick Europa's icy crust is. Computer simulations suggest it is relatively thin – perhaps 4 miles deep. But it may reach all the way to the planet's rocky surface, 60 to 120 miles down.

JIMO may help solve the puzzle. It could carry special lasers to make precise measurements of how Europa's surface flexes under the influence of Jupiter's strong gravity. If the surface flexes a lot, the icy crust is thin. If it doesn't flex much, it must be thick.

The craft also could carry radar to "see" through the ice and give scientists an idea of whether the ice contains slushy or liquid "bubbles." Such bubbles could be places where life might be found.

In fact, Greeley and some colleagues just got back from studying the Arctic ice cap. One biologist collected some microorganisms that she's now testing to see if they can survive in conditions like those thought to exist on Europa.

No one thinks microscopic critters could live on Europa's surface. It's too cold (about minus 260 degrees F) and gets too much radiation from Jupiter.

But slushy or watery bubbles even three or four feet below the surface could be safe places for microbes to live.

If the ice is fairly thin, Lloyd French has a good idea about what to do next: Send some of his "cryobots" to Europa.

The JPL engineer has designed small, torpedo-shaped cryobots ("cryo" for cold, "bots" for robots) that would use nuclear power to melt

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PHOTO ILLUSTRATION BY ADAM WEISKIND – STAFF
PHOTOS: NASA, REUTERS, AP

EUROPA FACTS

Discovered: Jan. 7, 1610, by Italian astronomer Galileo.

Diameter: 1,949 miles, slightly smaller than Earth's moon (2,160 miles). It's five times as reflective as the moon, though, because it's covered with ice and is the smoothest object in the solar system.

Gravity: About 1/8th that of Earth. If you weigh 60 pounds, you'd weigh just 8 pounds on Europa.

Distance from Jupiter: 417,000 miles, almost twice as far away as our

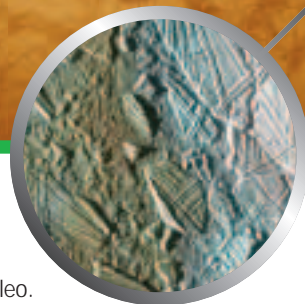
FROZEN WORLD: Astronomers wondered why Europa was so bright until Voyager flybys solved the mystery in 1979. The moon is covered with fractured water ice.

moon is from Earth. It takes Europa a little more than 3-1/4 Earth days to zip around Jupiter (versus 28 days for our moon). Jupiter is a little more than five times as far from the Sun as the Earth is.

Composition: Europa appears to have a core of rock and iron covered by an ocean of water or slush 60 to 125 miles deep. The ocean is capped by a sheet of ice perhaps four miles thick. The gravitational tug of war among Jupiter and its moons creates the heat that keeps the water from freezing.

Atmosphere: There's a very thin atmosphere of oxygen.

SOURCE: JPL/NASA



You, too, can help 'listen' for aliens

COULD INTELLIGENT, technologically advanced life exist beyond our solar system? Scientists are trying to find out. Some are using optical telescopes to look for laser-beam signals. Others use radio telescopes to listen for radio signals. And one of these radio teams needs your help.

Using a home computer and a free computer program from the University of California at Berkeley (go to: <http://setiathome.ssl.berkeley.edu>), you can take part in the hunt for E.T.

SETI@home scientists at the university are sifting through radio signals from space (a big source of naturally generated radio signals), looking for ones that might indicate a high-tech civilization. The signals are received at the world's largest radio telescope, located in Arecibo, Puerto Rico.

The raw signals from the telescope are broken into small chunks that a

modern home PC or Mac can analyze while you're running other programs or when your screen saver activates. When your computer is done, it sends in the finished chunk and downloads a new one. In March, the team used the Arecibo radio telescope to revisit 166 promising signals out of billions they'd noted since the program began in 1999. A more detailed survey is planned.

But what are the chances we could "swap howdies" with another civilization if we found one? It's tough to say, but one thing is for sure: The conversation would be slow! In April, astronomers reported discovering the 106th planet outside our solar system. It's 119 light-years away. That means that if intelligent aliens lived in that system, we'd have to wait 238 years for an answer to our signal saying "Hello!"

P.N.S.

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through the ice. The "bots" would carry scientific instruments to analyze the ice and would leave small radio-relay devices behind as they descended. The radios would get stuck in the ice as it refroze behind the bot. The radios would relay data from the bot to a lander on the surface, which would send it to Earth.

Mr. French tested a prototype bot on an ice-covered lake in Norway in January 2002. The tests "told us it was working,"

he says. And if he doesn't have a chance to use them at Europa anytime soon, he adds that they also would be useful in studying the polar ice caps on Mars.

With all these tantalizing puzzles to solve, Greeley says, "it's a really exciting time in human history. We're seeing new worlds for the first time."

Peter N. Spotts



Enter the Monitor's Design-an-Alien Contest

What kind of creature might lurk, swim, or scoot around under the ice crust of Europa, a moon of Jupiter? What would it look like? What would it eat? How would it get around? Communicate? Have fun?

Draw a picture, write a brief description, and send them to us - along with the filled-out coupon below (or a copy) - by Friday, June 13. Include a self-addressed, stamped envelope if you want your entry returned.

Or, e-mail your alien as a JPEG attachment to: homeforum@csmonitor.com. Please include a description and the personal information requested on the coupon.

We'll publish the aliens we like best in June. And we'll turn our very favorite alien into a T-shirt to send to the top three designers! Other winners will receive certificates and extra copies of the Monitor. No more than three entries per person, please. Contest is open to preschoolers through high-schoolers. **DEADLINE: JUNE 13.**

You may download and print out this entry form at: www.csmonitor.com/alien

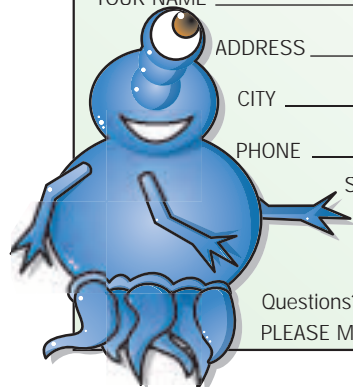
NAME OF ALIEN _____

YOUR NAME _____ GRADE IN SCHOOL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE _____ E-MAIL _____



SEND YOUR ALIEN DRAWING AND DESCRIPTION TO:

The Home Forum, Design-an-Alien Contest
The Christian Science Monitor, P02-20
One Norway Street, Boston, MA 02115

Questions? Email homeforum@csmonitor.com

PLEASE MAIL YOUR ENTRY BY JUNE 13

ADAM WEISKIND - STAFF