

In the Mojave, a scientist-entrepreneur works to 're-create Martians'

November 29 2013, by Monte Morin

The sun is fading, the temperature is dropping and this desert party is just getting started.

They're prying open beer bottles and blasting rock music from an RV. Motorcycles rest on kickstands beside an ancient lava flow while revelers talk excitedly about alien worlds, teleportation and the creation of life.

It's a spectacle that easily could be part of Burning Man, but this gathering is even more mind-blowing than anything you might find at the New Age festival.

On this sun-blasted tract of sand 14 miles south of Baker, Calif., molecular biologist and entrepreneur J. Craig Venter is field-testing a technology that he says will revolutionize the search for extraterrestrial life.

Not only does Venter say his invention will detect and decode DNA hiding in otherworldly soil or water samples - proving once and for all that we are not alone in the universe - it also will beam that information back to Earth and allow scientists to reconstruct living copies in a biosafety facility.

"We can re-create the Martians in a P-4 spacesuit lab, if necessary," the 67-year-old says matter-of-factly as he relaxes with his poodle, Darwin, in a luxury camper.

It may sound outrageous, but Venter's concept of biological teleportation has captured the attention of scientists at NASA's Ames Research Center in Silicon Valley. Half a dozen Ames emissaries - experts in astrobiology, geology and planetary and environmental science - are on hand to assist in the field test.

The prospect of building a device that could land on Mars, or one of Saturn's moons, and analyze samples without having to return to Earth would save billions of dollars. It also would eliminate the potential risks of bringing home alien pathogens, said Ames Director Simon "Pete" Worden.

"The next mission to Mars will be in 2020," Worden said. "That mission may well have this (technology) on it."

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The unforgiving Mojave Desert, with its shifting sand dunes and rugged fields of basalt, long has played the role of stand-in at Mars exploration rehearsals.

Such was the case when a team from NASA and the nonprofit J. Craig Venter Institute in San Diego and Rockville, Md., trudged through the desert last weekend, flipping over rocks in search of a bacteria with "super powers," as Ames planetary scientist Chris McKay put it.

Highly resistant to radiation and extreme temperatures, the cyanobacteria called *Chroococcidiopsis* is a green crud that covers the bottom of translucent quartz rocks.

Among other attributes, the stuff refuses to die when deprived of air and water.

Scientists believe this is the sort of extremeophile that may be hiding out on other worlds, so they plan to use it in their terrestrial test run.

"We're in love with this organism," McKay said. "It's the closest thing we have to Martians."

McKay, an ardent proponent of terraforming - the theoretical transformation of planets or moons into life-supporting worlds - said *Chroococcidiopsis* might one day prove useful in making Mars habitable for humans. If the oxygen-producing organism took root on the Red Planet, it might completely alter the climate and atmosphere in 100,000 years, McKay said.

But on this day, the game plan was to collect samples of the bacteria, prepare them for analysis and then load them into a genetic sequencer to determine the unique order of four repeating nucleotides, or chemical "letters," in the bacteria's genome.

Once that's accomplished, the cyanobacteria's DNA sequence will be uploaded to the cloud and then downloaded by scientists at Venter's for-profit company, Synthetic Genomics Inc.

In the Mojave, all this work is taking place in a massive trailer and requires a team of scientists. If it's ever used on Mars, the technology is going to have to be roboticized and shrunk to a fraction of its current volume.

"It needs to be the size of a shoe box," McKay says.

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Venter has made his career by turning improbable ideas into reality.

He goaded government scientists into a historic race to decode the human genome, vastly accelerating the process with his technique of whole genome shotgun sequencing. While searching for undiscovered forms of life in the world's oceans, he analyzed seawater for strings of DNA and identified 1,800 new species of aquatic microbes.

In 2007, he successfully transplanted the genome of one species of bacteria into another. Three years later, he announced that he had built a DNA sequence in the lab and "booted it up" within a single cell of bacteria. This cell went on to reproduce a colony of cells that bore the same lab-formulated DNA.

When he published that feat in the journal *Science*, Venter said his team had created "synthetic life." Critics condemned him for "playing God." Others downplayed the achievement, saying he hadn't actually created life from scratch.

Venter, a devout atheist, dismisses the criticism from both factions.

"We're creating new life," Venter said. "Is that creating life? I'm not sure I really care. It's a semantic argument."

While the desert field experiment was a test for the unit that hypothetically would travel to Mars to send back data, Venter said a prototype of the receiving technology exists as well. That device, which downloads the DNA sequence and prints out the corresponding nucleic acids, will be available for sale in 2014.

This technology will have many uses on Earth, Venter said.

The U.S. government could use it to identify biological agents in the field - perhaps dropping a sequencing unit from a C-130 aircraft and allowing scientists to identify the organisms in the safety of their lab

thousands of miles away. Health agencies could use it during viral epidemics.

Venter says the receiving unit ultimately will be the size of a computer printer. With it, consumers will be able to "download" vaccines and produce insulin, among other medicines.

"We hope to sell a lot of these machines," he says.

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Venter's chutzpah is matched by his larger-than-life personality.

Venter was awarded a National Medal of Science in 2009 by President Barack Obama. He maintains an expensive collection of automobiles, motorcycles and art - not to mention the 95-foot lab yacht Sorcerer II.

At the Mojave test site, buttoned-down NASA scientists watched with amusement as Venter's entourage began to arrive, stylishly late.

First, a tour-bus-sized RV rolled in, provoking investigation by park authorities. Venter arrived in a pickup truck towing a trailer loaded with adventure bikes, luggage, beer, a bottle of aged scotch and copies of his new book, "Life at the Speed of Light: From the Double Helix to the Dawn of Digital Life."

As Venter stepped from the truck with his wife and publicist, Heather Kowalski, he was surrounded by Venter Institute scientists who scrambled to greet "the boss."

Because it would take 26 hours for the field lab's sequencer to decode the Mojave desert samples, Venter brought the motorcycles to help pass the time. That's how he encountered the weekend's first glitch: His

BMW R1200 GS Adventure would not start.

As daylight faded and the scientists wrapped up their day's work, Venter cranked up music, sent for pizzas in Baker, and kicked off an impromptu party. The main topic of conversation: life elsewhere in the universe.

"They sent Curiosity to the last place on Mars where they would find life," complained one scientist, cocktail in hand

"And it has a tiny drill," lamented another.

Venter, who toted a growler of craft beer, said the key to finding evidence of life on Mars would be digging deep into the planet, perhaps as deep as a kilometer or more, where water may exist.

"I would not bet on finding any microbes on or near the surface of Mars," he said.

But why stop with the Red Planet? A biological transporter should be sent to the Saturnian moons Titan or Enceladus, one expert argued. Enceladus is thought to have liquid water beneath its frozen surface, and it spews ice into space. That ice ultimately becomes part of Saturn's rings.

As a dozen or so scientists discussed the hunt for ET, some found it difficult to maintain balance. Was it the alcohol? No, the RV had begun tilting under their collective weight.

"Everybody move to the other side!" somebody bellowed. They did.

"I could think of a lot more interesting places to go than Mars," Venter said, barely missing a beat as the conversation continued.

Data from the Kepler space telescope suggest that every fifth star in our galaxy has a planet that might hold liquid water - a key ingredient for life. That means billions of planets in the Milky Way have the potential to be inhabited by living organisms, scientists say.

In the face of such odds, Venter said, he's astounded that some people dismiss the idea of [life](#) beyond Earth.

Venter shook his head.

"And people think I have a big ego," he said.

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