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Mars attracts

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Joseph Palaia wants to move away. And the sky isn't the limit

By Irene Sege, Globe Staff | December 22, 2005

CAMBRIDGE -- Back when Joseph E. Palaia IV and the former Melissa Blom were college sweethearts in New Jersey, at a time when most new couples in love think of being together, not apart, he told his future wife that if she wanted to be with him she'd have to let him leave for several years to live on Mars.

"In fact, it was a criteria. She needed to accept the fact that I'm going to Mars one day," Palaia recalls. "This is who I am."

Palaia is a 26-year-old MIT graduate student who recently cofounded 4Frontiers, a company dedicated to the permanent settlement of the red planet, and, in the meantime, to consulting and creating a model Mars village in Florida or California or New Mexico that could double as research center and tourist destination. He's an Eagle Scout born after the last manned mission to the moon and before unmanned missions to the fourth rock from the sun. He's a student of nuclear engineering -- which he'll need to "arrive, survive, and thrive" on Mars -- who grew up watching "Star Trek" at the supper table and imagining himself in space.

"The lure of a frontier has a tendency to bring out the best in humanity," Palaia says. "It attracts the dreamers, the innovators. So I think it will truly be an exciting time to be alive."

Palaia hurries one recent evening through the labyrinthine halls connecting one MIT building to the next and arrives, a few minutes late, for the weekly meeting of the Mars homestead group. Also in attendance are a retired math department secretary, an MIT freshman proposing an independent study on mission planning, and Bruce Mackenzie, the longtime Mars aficionado whose work designing a colony for the nonprofit Mars Homestead Project he cofounded, underpins 4Frontiers.

Palaia, plaid-shirted and earnest, belongs to a new generation of Mars dreamers, young and impatient and romantic enough to foresee a future full of possibilities. He views NASA's Mars rovers as robotic Christopher Columbuses and Ponce de Leons exploring a new New World in advance of human pioneers.

"If you think about the settlement of North America, was it settled by people who came over and did science for a year?" Palaia asks. "Or was it settled by people who pulled up their roots, sold everything they owned, and set out for a new life? It was a bold thing to do. It's about time we do something bold again."

The evening's agenda is Palaia's report on his trip to Japan for the Space Generation Congress. His presentation is one part tourist slide show, one part video of his talk there. "If you want to achieve great things," he says onscreen, "you have to have great goals."

The great goal is settling a planet that, when Mars is closest to earth, takes about six months to reach using current technology. Even a short visit could take three years, round trip, because the optimal time to return occurs once every Mars year, roughly two Earth years. Though the moon, mere days away, is considerably closer, scientists note that Mars is the more hospitable place.

Mars, scientists say, has water beneath its surface that Palaia expects 4Frontiers to tap. Its carbon dioxide atmosphere could be drawn into a domed community that includes the plants necessary to create oxygen through photosynthesis. Its water could be broken down to provide additional oxygen. Mars has minerals. Its gravitational pull is one-third that of earth's, compared with the moon's one-sixth, which, says Northern Arizona University astrophysicist Nadine Barlow, "is still better than the space station where you're in microgravity where you have to be concerned about the bones deteriorating."

Mars, to be sure, is a severe setting -- dusty, cold, its atmosphere low-pressure and thin. Yet, Palaia says, it

has the ingredients to sustain agriculture and industry. "The moon lacks key resources that are vital for life and vital for industry," he says. "You have to focus on developing self-sufficiency. If you have to depend on bulk shipments from earth, it's going to be very expensive."

Indeed, the skepticism, among some Mars watchers, about 4Frontier's ambitious goals comes more from such practicalities as timetable and money and the planet's appeal than from the science behind the company's plan. 4Frontiers hopes to launch a robotic equipment drop-off around 2017, and to have an initial settlement of a dozen people -- arriving on three four-person flights about two years apart -- in place by 2025. NASA doesn't expect to start planning manned missions to Mars until after it revives human exploration of the moon around 2018.

Robert Zubrin, Mars Society founder and author of "The Case for Mars," wonders why, absent a lucrative prize, investors would back 4Frontiers' risky, multibillion-dollar venture. He questions whether 4Frontiers' tourist center and consulting business could generate enough revenue to settle Mars. "They're good people. I don't think they're charlatans in any sense," he says. "I don't think they understand the difficulties involved. If there was a prize, then, indeed, a company like this might, indeed, have a chance of mobilizing private capital to engage in a private space race to Mars."

So far, 4Frontiers has raised about \$1 million of the initial \$25 million it seeks. "We don't have all the answers yet but we're working on them," Palaia says. "We know we can do these beginning steps."

Cornell astronomer Steven Squyres, principal investigator for NASA's Mars Exploration Rover Mission, poses another question. "If people aren't willing to live on Antarctica, why would they be willing to live on Mars?" he asks. "I do not want to come across as a wet blanket," he adds. "I hope they succeed. I see some big obstacles to overcome, but I have a lot of admiration for somebody who's willing to try something like this."

To Squyres's question, Palaia has a simple answer: Because it's there. Never mind that his own Boy Scout experience included nothing more rugged than a grueling two-day climb up New Hampshire's Mount Washington at age 14 (and, in a lesson he applies to planning trips to Mars, learning firsthand the woes of carrying excess cargo in his backpack).

Palaia, son of a civil engineer and an art teacher who read Scientific American to her babies, builds on passions he's nurtured since his childhood in New Jersey. His mother, Beverly, herself an unsuccessful applicant to the teacher in space program, can't remember a time when the oldest of her three sons didn't dream of Mars. He dressed as a space cadet one Halloween, a robot another. He went to space camp and founded his high school's robotics team. On his bedroom ceiling was a mural of the space shuttle. "It looked like you looked out your window and there was the space shuttle going by," he recalls. Now the study in his Framingham apartment is decorated with space posters and NASA patches.

What about the risks involved in building a city on Mars? After all, people died settling the New World. "There was a bit of hardship," Palaia says. "People died, and people will probably die in the settlement of this frontier. I think it will be worth it."

Facing challenges

Palaia, a research assistant in MIT's Space Propulsion Laboratory, lugs a student-designed and -built metal stand to the lab's sink for degreasing, in preparation for placing it in the vacuum chamber for an experiment using ionized gases to create a more efficient means of electric propulsion to keep orbiting satellites in place.

"I don't think directly it has any application for going to Mars," Palaia says. "But at 4Frontiers we're looking at developing this entire space economy, on the moon, in near-earth space, in Mars space, and possibly even asteroids. A thruster like this could be useful."

Palaia, who earned his bachelor's degree at the New Jersey Institute of Technology, expects to finish MIT in February with a master's in nuclear engineering -- and then to work full-time for 4Frontiers. In addition to the practical hurdles confronting the company, Palaia faces a personal one. The firm plans to send its initial dozen settlers on one-way trips. Palaia's wife, coordinator of an after-school program, has been thinking, since their 2002 honeymoon on a Disney cruise in the Bahamas, of running children's programs shipboard while he's on Mars. She has no interest in visiting Mars, much less moving there.

"That's a source of contention," Palaia says. "I really think if I saw people go and I didn't go, I'd be content. I'd love to go. We'll see if it's in the cards."

Palaia offers another reason to hope 4Frontiers sends some settlers home.

"You want ticker-tape parades," he says. "You want heroes, and you want to share the experience." ■

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