



Germ warrior: NASA's planetary protection officer is up to his ears in bacteria.

PROFILE

John Rummel protects all of the planets, all of the time.

By Wendy Wolfson

"And scattered about it, some in their overturned war-machines, some in the now rigid handling-machines, and a dozen of them stark and silent and laid in a row, were the Martians—dead!—slain by the putrefactive and disease bacteria against which their systems were unprepared; slain as the red weed was being slain; slain, after all man's devices had failed, by the humblest things that God, in his wisdom, has put upon this earth."

—H.G. Wells, *The War of the Worlds*

JOHAN RUMMEL, the planetary protection officer at the U.S. National Aeronautics and Space Administration, pulls his badge from his briefcase. Sporting an emblem from a science fiction TV show, *SeaQuest DSV*, it's hardly regulation issue for a government employee. But his job is

hardly typical either. Mr. Rummel is on a mission to protect us from potential alien invaders and to protect potential alien life forms from us.

NASA has embarked on a second golden age of planetary exploration, sending spacecraft to Mars and eventually to Jupiter's moon Europa, where there are signs of water—and the potential for life. Mr. Rummel's job is to ensure no unwanted germs make the trip, in either direction. As head of the International Committee on Space Research's panel on Planetary Protection, Mr. Rummel works with space agencies, scientists, and engineers to develop policies to prevent interplanetary contamination.

As planetary protection officer, he must stay current on the latest scientific thinking about the nature of life on Earth

and the potential for life elsewhere. He must also grasp the minutiae of spacecraft technology and be able to play well with others, including the NASA bureaucracy, Congress, and international scientific organizations. "Diplomacy is good when you have it," Mr. Rummel deadpans. As NASA's enforcer, he can yank the budgets of compliance violators and push the button to halt a launch. A sense of humor helps, too. To inspire good spacecraft hygiene practices, he had bumper stickers printed with the planetary protection motto: "All of the Planets, All of the time."

Unfortunately, nobody knows exactly what sort of life this hygiene is protection against. The simplest possibility is that it's related to Earth life. According to a theory called panspermia, chunks of rubble blasted off Mars and Earth by asteroid collisions over the last 3.5 billion years may have ferried simple organisms between the planets. (Meteorites from Mars still fall to Earth regularly.) Then again, Mars may harbor novel life forms that biologists aren't geared up to detect. To cover all the bases, Mr. Rummel says, NASA will have to probe samples with a variety of chemical, isotopic, and molecular techniques, while keeping them in yet-to-be-designed, completely secure containment facilities. "It is simple prudence," says Mr. Rummel. "If there is life on Mars, you don't want astronauts finding out about it by getting sniffles on the way home."

Mr. Rummel and his cohorts worry more about 'forward contamination'—homegrown microscopic hitchhikers infecting other worlds. "The whole point of the space exploration program is to know if there is life on other planets. The last thing that you want to do is to go to Mars to learn about microorganisms from Florida," he says.

Mr. Rummel received a Ph.D. in community ecology and evolution from Stanford University in 1985. A year later he started at NASA as a National Research Council research associate. Hoping to become an astronaut, he found himself studying potential alien life instead. For six years he ran NASA's exobiology program to understand the origin, evolution, and distribution of life in the universe. His

Photography by Douglas Woods. Photo of bacteria by E. Imré Friedmann, Florida State University.

FORWARD

other extraterrestrial-related duties included serving as the SETI (Search for Extraterrestrial Intelligence) program scientist for both the life sciences and solar system exploration divisions, and leading the U.S. teams cooperating with Russian exobiology and astronaut life-support staff. An active-duty Navy flight officer for five years, Mr. Rummel is still a commander in the reserves.

He left NASA in 1993 to become director of research administration and education at the Marine Biological Laboratory in Woods Hole, Massachusetts. In 1997, he was recruited back to the agency to serve as planetary protection officer. During the week, he lives on a boat in a Washington, D.C., marina, commuting to Woods Hole to visit his family on weekends.

Mr. Rummel's current job represents the flip side of his early work in exobiology (since rechristened astrobiology). Mr. Rummel's predecessor in planetary protection, Michael Meyer, explains that the astrobiology program wants extra-

terrestrial life samples, but the planetary protection officer has to put the brakes on to make sure the samples are securely wrapped. Because life-detection and sample-collection missions are a pressing goal of NASA's Mars program, Mr. Rummel must weigh the ethics and risks of bringing a contaminant from space to Earth against the benefits of gathering knowledge about extraterrestrial life and the costs of prevention.

NASA decided in the early years of the space program that the Moon didn't need protection from earthly bugs because its surface is likely dead, but by the early '70s, the agency was spending about \$4 million per year to sterilize spacecraft for Viking missions to Mars. To avoid contaminating its Mars life-detection experiments, NASA did everything short of encasing its spacecraft in condoms. Before the 1975 launch at Cape Canaveral, NASA cooked the Viking lander in its bioshield, like a big casserole dish, at more than 100°C for 54 hours in a giant oven.

After Viking, a lull in Mars missions made planetary protection moot. In 1992, however, the National Research Council, spurred by the discovery of ever-stranger and hardier life forms here on Earth (like denizens of deep-sea hydrothermal vents and *Deinococcus radiodurans*, a bacterium that lives in the cooling towers of nuclear power plants), recommended strict forward-contamination requirements for future missions to Mars.

"Some of the questions are not knowable until you do the mission," Mr. Rummel says. "The watchword of planetary protection is to be conservative when you are ignorant—especially when you realize that you can do things that are irretrievable. You can contaminate a planet in a way that would ruin the reason why you went there in the first place." ■

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