

Mundane Science Bill Downs

Unexpected Guests

NASA expects to scoop up and send back samples of the Martian soil as soon as 2015. We may then know if there is or ever was life on Mars.

Martian microbes, if they exist, are the product of an evolutionary path that is millions, if not billions, of years removed from the path life on Earth took. They could be very vulnerable to earthly organisms. On the other hand, our guests from next door may be highly robust, kind of like a microscopic kudzu, capable of spreading across Earth, a planet with no natural defenses. "We have found life on Earth in many environments where we once thought it couldn't exist," says John Rummel, head of NASA's planetary protection program. "Such tenacity may provide a lesson about life, and it certainly argues for caution in our exploration of the solar system."

Until we know for sure, the samples will be handled in one of the two facilities that study Earth's most dangerous pathogens, like the Ebola virus. One of those labs is at the Centers for Disease Control and Prevention in Atlanta. The second is at the U.S. Army's Research Institute for Infectious Disease in Ft. Detrick, Md. A third possibility is the maximum containment lab being built at the Medical Branch of the University of Texas-Galveston for research into mosquito-borne viruses.

Under international treaty, NASA and other space-faring countries are obligated to make sure the unthinkable doesn't happen. That caution will, initially, take the form of confinement. NASA has plans for a \$30 million Mars Quarantine Facility. A facility where scientists will attempt to make the initial conclusions about whether the Mars samples have any trace of life and if they are safe to release for more detailed research elsewhere.

Even though Mars samples are not due back for more than a decade, researchers are saying that NASA needs to begin the process of choosing a site and deciding who will staff the lab as soon as possible. The research council advising NASA says that planning and construction of the facility must begin at least seven years before the return of the samples. Allowing for government procedures means that site selection needs to go forward even sooner.

Because of the greater potential for life on Mars, the margin for error has to be zero. Lunar samples returning from the Moon were exposed to open air twice during their transfer from the capsule to the repository at Johnson Space Flight Center in Houston after each Apollo mission. The lab must utilize the best and most rigorous design criteria. Technically equivalent to the facilities where the most dangerous pathogens are studied. Equally important is a ready supply of workers familiar with working in the highest levels of isolation and security. The lab will probably be used to screen Mars samples in addition to samples from comets, asteroids, and other bodies NASA may visit. The required combination of high level- containment with clean-room technologies is different from anything that exists today.

Scientists believe that the simplest. Most primitive life forms such as viruses, viroids, and prions are unlikely to be a threat. They don't have sufficient genetic material to reproduce on their own and require a host to survive. More advanced microbes, like bacteria, have their own genetic material and can reproduce on their own. They are also hardy and adaptive. Scientists have been surprised by their ability to survive in extremes of light, dark, heat, cold, pressure and salinity.

"Alien life forms might find a niche in which they could proliferate," the council cautions. "At our present state of technology it would be difficult, or impossible, to fully evaluate the potential impacts of alien life forms on our complex ecosystems."

Mike Toner, Atlanta Journal-Constitution, 8/5/2001, pg. F-1&6

