

EXO BIOLOGY

SETI Faces Uncertainty on Earth and in the Stars

On 12 October, the 500th anniversary of Columbus' discovery of the New World, Earthlings will initiate a radio search for whole other worlds that will be a million times more capable than the feeble attempts that have gone before. Listening in on other stars with some of the most sensitive antennas in the world, the 10-year NASA-funded survey will search for an artificial signal that could come only from intelligent extraterrestrials.

The searchers are eager to get started—for reasons that may not be purely scientific. The program has long had its critics in Congress, and in times of exceedingly tight funds it may be even more vulnerable than usual. Early hints of a signal would be the program's best answer to those trying to cut off its funding before the search really gets going.

But don't hold your breath waiting for news from the stars, says participant Bernard Oliver of NASA's Ames Research Center. Even this incredibly sensitive Search for Extraterrestrial Intelligence (SETI) falls far short of what may be needed to find out whether we have company in the universe. "We have stepped out of our house," he says, "but we're not even down the front steps yet." It's a big galaxy, and unless some other civilization is already beaming powerful signals our way, current capabilities would probably miss even abundant intelligent life.

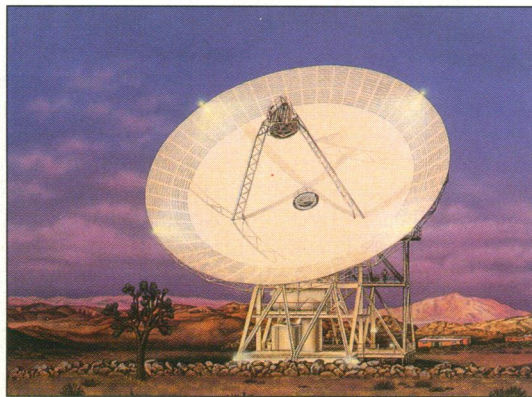
Even so, if the \$10 million to \$15 million a year in funding for NASA's planned search is sustained, the effort would still dwarf all of the 60-odd efforts that have been conducted over the past 30 years. Frank Drake, now at the University of California, Santa Cruz, conducted the first radio search in 1960. In Project Ozma (after Princess Ozma of the Land of Oz), Drake pointed the antenna at two stars for a total of 200 hours, recording data at a single radio frequency. Since then, by increasing antenna size, adding channels to cover a broader span of the microwave spectrum, and speeding the electronic analysis of received signals, SETI researchers have multiplied the power of their searches. The 6-year, ongoing Megachannel Extra-Terrestrial Assay (META) search being conducted by Paul Horowitz of Harvard University, for example, is 10 billion times more capable than Project Ozma, according to Drake's calculations, thanks in large part to META's 8 million channels.

The 10-year NASA search would be 10,000 times more capable than that. In one part of the program, an Ames team will start

a targeted search of 1000 nearby stars with the world's largest antenna, the 310-meter dish of Arecibo Observatory in Puerto Rico. In another part, a group from the Jet Propulsion Laboratory will carry out a less sensitive search of the entire sky that will eventually cover 320 million channels. In its first fraction of a second, Drake estimates, the NASA search will equal his entire 200 hours of effort in 1960.

But even that could still fall short by another factor of a million of what would be needed to rule out extraterrestrial intelligence in our galaxy, NASA SETI workers readily concede. "I really don't expect success soon," says NASA's Oliver, who if not the team's pessimist is its most vocal realist. "I'm trying to encourage some perspective [outside NASA] in case it doesn't succeed right off. If we don't [succeed], it might be taken as a sign that there is not extraterrestrial intelligence. That would be a mistake."

The problem is sensitivity. Arecibo can detect a signal of 1 picowatt spread over the surface of Earth. That would be good enough to pick up a signal beamed directly at us from halfway to the center of the galaxy—14,000



A big ear. A 34-meter antenna at Goldstone will scan the entire sky.

light-years away—if the signal's power were the same as the Arecibo telescope emits when it radar maps the planets. But Oliver notes that Arecibo could eavesdrop on the sort of ordinary radio and TV signals that leak from Earth only out to a distance of a few light-years.

Since NASA's best hope is that some other civilization is already trying to contact us, the targeted search will begin with stars within 40 light-years or so and work outward. Any civilization within that range may have already picked up indications of our existence—radio's "Jack Benny Show," say, or TV's "I



Shouting distance. SETI could detect an ET TV show only within a fraction of the galaxy (circle).

Love Lucy" —triggering a response on its part. Or, with luck, a NASA antenna might find itself in line with a powerful beam intended for a third party.

The searchers will need some luck on the ground, as well. Next year, or anytime after that, Congress could tell them to cut short the search, their budget having been zeroed out. "We've been there before," says SETI project scientist Jill Tarter of Ames, referring to the budget battles, "and every year it seems to be worse than the year before."

SETI's main encumbrance, say researchers, is its "high giggle factor." In spite of endorsements from three consecutive National Academy of Sciences reports on priorities in astronomy, congressmen seem fond of lampooning the whole idea as a waste of precious federal money "to look for little green men with misshapen heads," in the words of one congressman (*Science*, 20 July 1990, p. 249). In past years, SETI has staggered through Congress by gaining a position on at least a couple of bills and then achieving something near full funding in a House-Senate conference committee.

This year, however, SETI almost failed to find a place on any bill, says Drake. "We were zeroed out in three out of four of the committees." The thread by which SETI hung was the Senate appropriations committee, which included the full \$13.5 million requested, thanks to SETI supporters Jake Garn (R-UT) and Barbara Mikulski (D-MD).

Garn and Mikulski's efforts carried the day with the conference committee this year, but NASA is taking no chances. Even as the SETI search approached its 12 October kickoff, NASA moved to lower SETI's profile on Capitol Hill in hopes of avoiding future congressional potshots. Until now called the SETI Microwave Observing Project and located within NASA's Life Sciences Division, the search has been renamed, removing any reference to SETI. It is now the High-Resolution Microwave Survey and has been moved to the Solar System Exploration Division. Further concealing it, the erstwhile SETI will be part of a broader program designed to locate nearby planets and any life on them, intelligent or otherwise.

But SETI researchers' fondest hope may be that all this maneuvering will be needed only as a stopgap measure. Nothing could safeguard the budget faster than a call from ET.

—Richard A. Kerr