

Aliens are almost surely out there—Now can we find the money to find them?

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Dan Werthimer thinks his testimony last week before the House Subcommittee on Science, Space and Technology went pretty well. As director of the SETI Research Center at Berkeley, Werthimer updated committee members on the search for extraterrestrial life, and provided a generally upbeat evaluation: ET microbial life likely is ubiquitous throughout the galaxy, and new technologies have improved the chances of detecting signals from advanced alien civilizations.

"They were quite engaged," Werthimer says of the representatives, members of a Congress notorious for its ideological partisanship and not particularly renowned for a deep commitment to science. "They asked

reasonable questions, and they seemed disinclined to go at each other."

On the other hand, Werthimer acknowledges that it is discouraging that the current science subcommittee has convened more hearings on extraterrestrial life than on climate change.

"This general backlash against science is frightening," he says. "(Denying [climate change](#)) is like playing Russian roulette with 99 bullets in the gun. I suspect it's because all the research indicates we're in trouble. People want to stick their heads in the sand."

But back to the happier (hopefully) topic of aliens. Part of the reason Werthimer made the dreary trek to the Hill was, unsurprisingly, money. It's something that researchers at SETI—an acronym for the Search for Extraterrestrial Intelligence—need more of if they're going to continue probing the cosmos.

"There are maybe two dozen full-time SETI researchers in the world, and we're all operating on shoestrings," he says. "We don't need a zillion dollars for this work. Our research is quite inexpensive, but we do need some money. More to the point, we need reliable funding. The fluctuations in funding have been more problematic than the amount of money. For example, sometimes we get money from NASA and sometimes we don't. That makes it difficult to plan experiments."

Werthimer has been involved with SETI since 1972, and he isn't disheartened that no alien yawp has yet been detected. He never really expected, he says, to discover ET in his lifetime.

"I thought perhaps my students would confirm something, or perhaps their students," he said. "The universe is a big place, and we're really in the infancy of this science. We're still not sure if we're even looking for the right things. Two hundred years ago, people would have been looking

for smoke signals, or geometric designs. Now we're monitoring the electromagnetic spectrum, and we've made tremendous progress. In the 1970s and 1980s, we could listen to about a hundred channels at once. Now we're able to monitor about five billion simultaneously."

But it's very possible that advanced civilizations abandon the wholesale transmission of electromagnetic signals as they progress, Werthimer says. Even Earth is getting quieter in the cosmic sense: As our transmissions increasingly are contained in fiber optic and copper cables, we put fewer electromagnetic signals into the ether. Aliens may be communicating via lasers, or artificially generated x-ray or gamma ray bursts, or neutrinos or gravitational waves. Too, seeking any communication medium may ultimately prove fruitless. Instead, we may someday identify advanced ETs by detecting large artifacts in distant solar systems—such as Dyson spheres, hypothetical energy-harvesting structures enclosing entire stars.

"One new thing we're doing is 'eavesdropping,' " he says. "As advanced civilizations develop, they may colonize nearby planets, and communication would be established between them. When those planets are aligned with each other and earth simultaneously, when they're all in the same plane, it would be much easier to detect electromagnetic emissions. And happily, this kind of alignment happens fairly often. We're targeting about a hundred systems."

Wertheimer emphasizes that SETI also looks for primitive life. For distant worlds, this ultimately may be possible through spectrographic analysis: evaluating the light reflected by the atmospheres of candidate exoplanets.

"Oxygen, for example, would betray the presence of photosynthesis," says Werthimer. "We aren't quite there yet with this approach, but I think we'll be doing it in 10 to 20 years."

Too, [extraterrestrial life](#) could well exist in our own solar system. The Jovian moon Europa has a vast sea of water encased by 50 miles of ice. Beneath that frozen cap could be anything from exo-bacteria to alien moon whales, participants in a food web charged by sulfide compounds pouring from hydrothermal vents. (Such vents have been discovered in Earth's marine abysses, sustaining colonies of giant tube worms and other exotic creatures—a remarkable exception to the general rule that food webs are structurally dependent on photosynthesis.)

Another candidate is Enceladus, a moon orbiting Saturn that is likewise covered by ice and supports enough water to fill the Lake Superior basin.

"Ultimately, we'd like to set something on those worlds, something that could get through that ice and see what's down there," said Wertheimer. He paused, and chuckled. "It's funny. I sometimes give talks at schools about our work, and when I tell young kids about the possibilities on Europa, I present the problem of getting through the ice and I ask them how they'd deal with it. The boys invariably want to use machine guns, bombs, high explosives. But the girls usually give more considered responses, like using giant mirrors to reflect solar energy to melt the ice."

Along with funding shortfalls, SETI has another problem. Most researchers are approaching retirement age, and it's unclear if there's enough young blood to keep the project going.

"Here at Berkeley, we have only one guy, Andrew Siemion, who took his PhD in SETI and is staying with the program," Wertheimer said. (Siemion testified with Wertheimer in Washington.) "He's doing brilliant work, but he's just one person. We need to recruit and train a new generation of researchers."

Provided by University of California - Berkeley

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