Interstellar Communication

The article "How Alien Astronomers Could Find Earth" (*S&T*: January 2012, page 24) assumes that if intelligent life exists, it is roughly as intelligent as we are. However, please consider that we live in a 13.75-billion-year-old universe on a 4.5-billion-year-old planet. It is statistically improbable that aliens are near our stage of intelligence.

If there is intelligence out there (which seems likely), it probably discovered Earth hundreds of millions of years ago. They deliberately do not contact us for the same reason that humans increasingly do not disturb wilderness areas: had contact been made 100 million years ago, life on Earth would have evolved much differently.

For these reasons, helping aliens contact us misses the mark. If they wanted to contact us, they would have already.

Phinizy Spalding
McDonough, Georgia

Dr. Lazio outlines the difficulties for generating a recognizable signal with which to communicate our presence to other civilizations. These difficulties doubtless explain the lack of results from the SETI program, since any other advanced civilization would undoubtedly have arrived at the same roadblocks to interstellar communication as we have. Therefore, we and our galactic neighbors all have our SETI earphones on, passively listening for a signal that no one is willing to transmit!

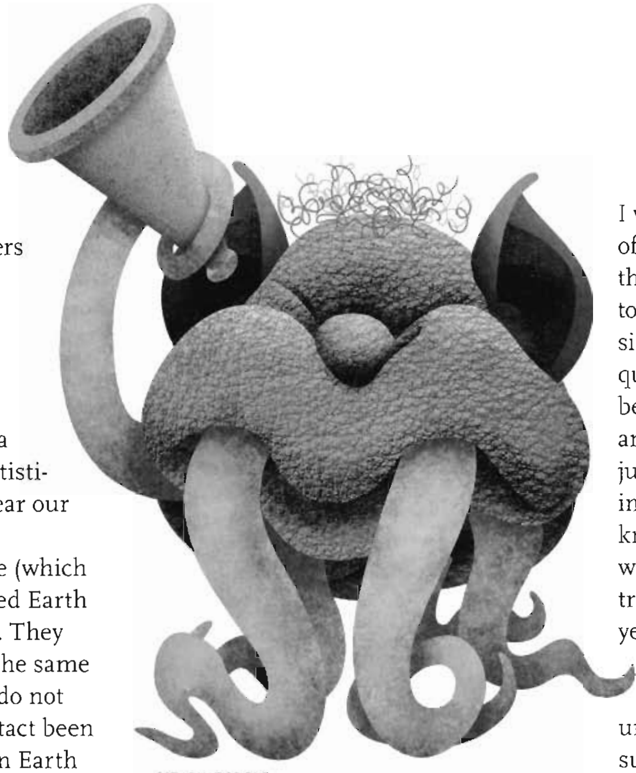
Gene Homme
West Milford, New Jersey

Wonderful article about how alien astronomers could find us on planet Earth. Author Joseph Lazio wonders if such aliens could pick up our light pollution, as well as episodes of *Gilligan's Island*. It turns out that they could — if they set up a gravitational-lens telescope 550 astronomical units from their own Sun-like star and used it to magnify an image of Earth. Such was reported by Seth Shostak (SETI Institute) in a past issue of a British astronomy magazine.

Such a distant observing outpost is beyond our current capabilities (the Voyager spacecraft are only about 100 a.u. away). But if aliens did manage to observe us that way, would they visit us pronto instead of waiting for their signal to reach us? I think they would.

Julian Grajewski
Hamburg, Germany

Author's Note: *The gravitational lens method could technically work but may not be practical. What happens if you want to point the lens telescope in a different direction? The spacecraft has to be moved. How far the spacecraft has to move depends upon how much you want to change the direction in which the telescope is pointing. Changing the pointing direction by only 1° requires moving the spacecraft by about 10 a.u., Saturn's distance from the Sun. In the worst case (looking the opposite direction), the spacecraft has to move more than 1,000 a.u.*



S&T: LEAH TISCIONE

I was disappointed that you spent 7 pages of the January 2012 issue talking about the futility of trying to say "Here we are" to neighboring stellar civilizations when a single paragraph can express that futility quite well. Intelligent beings could hardly be expected to waste the prodigious amounts of energy that Lazio describes, just to signal other star systems. And no intelligent being is likely to use any of the known communication methods to connect with another system's inhabitants. Imagine trying to play chess with someone 50 light-years away. By the time they responded to your move, you'd be long gone. There will be no interstellar "communication" until signals can be exchanged via subspace or some other as-yet-to-be-discovered faster-than-light process.

I'd also like to ask for a clarification: In the sidebar "Could Aliens Listen to Our Radio or Watch Our TV?" (page 30), you said that "any nearby civilization must have telescopes 100 times more sensitive than our current radio telescopes to have any hope of detecting our TV signals." This statement seems rather vague. How close is "nearby?" And how close would a civilization with our current level of technology have to be to listen in on our radio and TV broadcasts?

Jack Ryan
El Dorado, Arkansas

Author's Note: *The short answer is that, with our current level of technology, we could only detect ourselves slightly outside the solar system and certainly not farther than about 1,000 a.u. That estimate is based on a combination of assumed values for things such as the TV channel frequency, transmitter power, and the sensitivity of the radio antenna that's receiving the signal. For example, if we were to use India's Giant Metrewave Radio Telescope to detect a TV broadcast of 600 MHz (about channel 30), the GMRT could be at most about 400 a.u. away. For reference, Alpha Centauri is more than 300,000 a.u. away. Thus, with our current technology one would need a telescope at least 100 times as sensitive*

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as the GMRT, which is among the most sensitive telescopes at the relevant frequencies.

Why is it so hard? For essentially all radio astronomy observations, the amount of power contributed by whatever source we're trying to detect is an incredibly small fraction of the total received power. Competing sources include the Milky Way, other sources in the sky, natural radio emissions from Earth, and even the radio telescope itself (the last two are good examples of radiation emitted because objects have a temperature). Which of these various contributions dominates depends upon the frequency we're observing at. At frequencies relevant for radio and TV broadcasts, the dominant, or nearly dominant, contribution is the radio emission produced by highly relativistic electrons spiraling in the magnetic field of our galaxy.

For the Record

✱ *In the map on page 74 of the January 2012 article previewing Venus's June transit, the region encompassing North America should be labeled "Transit in progress at sunset," not sunrise. The map on page 70 of the article has the correct labels.*

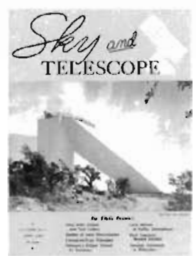
✱ *On page 22 of the February 2012 article "Einstein's Shadow," the labels for the Sgr B1 and Sgr B2 star-forming regions are reversed. Thanks to Dave Mehringer for pointing out the switcheroo.*

For a list of past errata, please go to **SkyandTelescope .com/Errata.**

75, 50 & 25 Years Ago

Roger W. Sinnott

March–April 1937

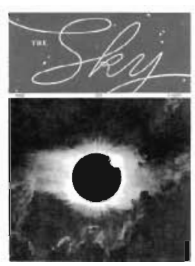


The Sun's Artillery "Research has conclusively demonstrated that sun-spots are huge solar cyclones, whirlwinds in the solar atmosphere, accompanied by pronounced magnetic conditions. . . .

"It has been suggested that the presence of huge magnetic fields in sun-spots results in their acting as howitzers to pour forth charged particles of matter into the interplanetary realm. If the earth is in the range of the howitzer, its atmosphere is the recipient. . . .Such terrestrial phenomena as auroral displays, magnetic storms, and effects on long distance radio reception should then occur."

Since Loring B. Andrews penned these words, astronomers have figured out that flares erupting in association with large sunspots, and not the spots themselves, are the "howitzers" — although the short cannon comparison needs a little stretching now.

April 1962

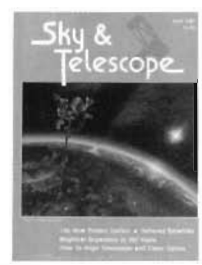


Cassegrain-Type Telescopes "Recently, the writer decided to compare the performance to be expected of a Cassegrain telescope with those of various other systems . . . evolved from it. The study was made in the course of developing an automatic lens-design program for use on the IBM 7090 computer at United Aircraft Research Laboratories. . . .

"The last and most complex member of the Cassegrain family that I have examined is the Schmidt-Cassegrain. . . ."

The Schmidt-Cass was then almost unheard-of, but it fared quite well in Ronald R. Willey's ray traces. Willey's S&T article inspired Celestron's founder to switch to the Schmidt-Cass design, ultimately turning the amateur telescope marketplace on its end.

April 1987



Giant Galactic Arcs "Perhaps the most remarkable announcement at the January meeting of the American Astronomical Society concerned the detection of giant arcs encircling at least two distant clusters of galaxies. Their scale is truly staggering. . . . In fact, they are the largest known entities in the universe that shine in visible light."

At the time of Leif Robinson's report, many astronomers didn't yet realize that the arcs were mirages — light from a galaxy far beyond each galaxy cluster, lensed by the cluster's gravity.