

The Darkest Day of the Year

by Dr. H. Paul Shuch, Executive Director

The brightest star in the SETI cosmos has extinguished. It seems sadly appropriate that Carl Sagan should leave us on the eve of Winter Solstice, the Northern Hemisphere's shortest day of the year.

I never met Sagan in person, although we enjoyed a brief correspondence toward the end of his life. Sagan was a dozen years my senior, but had been a stellar student who raced through school at light-speed, so that by the time I started graduate school, his name was already a household word. I read about him first in accounts of the 1961 *Order of the Dolphin* meeting at Green Bank, while I was still in high school. I was puzzled by the press references to this "brilliant young professor" who seemed positively ancient to me!

The first of his books I encountered was Intelligent Life in the Universe, which he co-authored with Shklovskii in 1966. I was in the Air Force at the time, and wondered why I could find no evidence of intelligent life in the military. But I was really struck by Dragons of Eden, which earned Sagan his Pulitzer Prize in 1978. I thought, "If this man speaks as well as he writes, he must be a fantastic teacher." A couple of years later, with the release of his PBS TV series, the world found out just how fantastic.



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Search**Lites**

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Since I had the honor of knowing Barney Oliver in the 1970s, SETI was already more than a familiar concept to me when Cosmos came out in 1980. But I always felt SETI was science's best kept secret. A cynical world wrote it off as fanciful science fiction or, worse, a blatant attempt of scientists to extort funding from an unsuspecting public. Sagan changed all that. Probably more effectively than anyone else, he championed the cause and bolstered SETI's image. He made it respectable for scientists to speculate about, and then seek out, other life.

Sagan was a brilliant research scientist, yes, but where he really shone was as a science popularizer, telemarketer, televangelist. His easygoing manner, evident charm and boyish good looks were, of course, an asset. But what made him Dr. Science to a whole generation was the way he made complex concepts accessible, without sacrificing accuracy. Like many educators, I have spent my whole career trying, never quite to my satisfaction, to emulate his style.

Dr. Sagan was a tough act to follow. Last year, accompanied by my ubiquitous guitar, I gave one of my SETI lectures at an East Coast college. (As I recall, one of the songs I sang was the ever-popular "Cosmic Carl," available in *Sing a Song of SETI*, our official songbook.) Afterward, a Physics professor told me "the music was nice. But when Sagan was here a couple of years ago, he was accompanied by a string quartet."

The simple fact is, no one can do Carl Sagan nearly as well as Carl Sagan did. The void he has left will be very difficult to fill. And I doubt the stars will ever again shine quite so brightly.

Guest Editorial

Theological Implications of SETI

Douglas A. Vakoch, Ph.D., Vanderbilt University
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Many theologians over the centuries have considered the implications of ETI existing. These theological speculations are important for at least two reasons. First, they give us clues about the ways that religious beliefs can influence openness to SETI. This has very concrete implications for funding of SETI. Second, they help us anticipate one factor that may influence people's reactions if we do receive a message.

Most theologians who have tried to imagine what ETI would be like do so by using theological frameworks developed for human beings. For example, an orthodox Christian account of human nature is that humans were originally "elevated," that they "fell" into sin, and that they have been given the opportunity to be "re-elevated." There was a flurry of writings on religious views of ETI in the years following the launch of Sputnik, particularly by Roman Catholic theologians, that used such a framework. For example, some theologians imagined races that had never been elevated, or races that had been elevated but that had never fallen.

The Roman Catholic theologian Clifford J. Stevens took a very different approach in his book Astrotheology: For the Cosmic Adventure (Techny, IL: Divine Word Publications, 1969). Stevens is the only theologian I know of writing in the latter half of the 20th century who expressly said that we should not try to fit ETI into frameworks that were designed to understand the human condition, and that instead ETI should be understood in terms of their own theologies. He believed that theology as humans know it could expand markedly if contact were established with ETI.

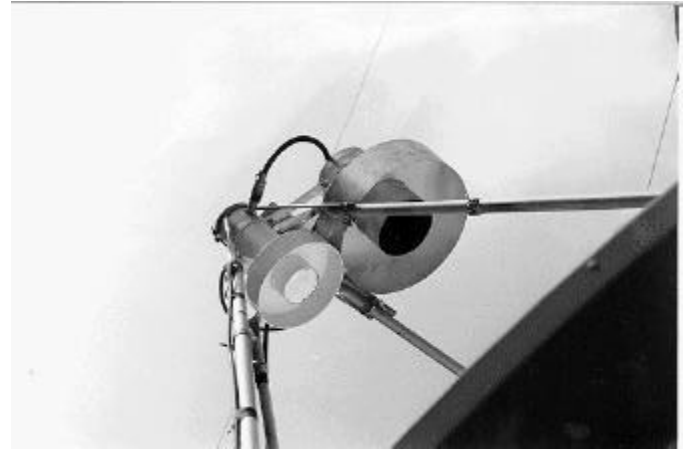
Father Theodore Hesburgh, CSC, President Emeritus of the University of Notre Dame, played an important role in emphasizing the compatibility of SETI and the theological search for understanding. In fact, Hesburgh paid a visit to Frank Drake at Green Bank during Project Ozma, and he continued to play a role in promoting SETI, e.g., by serving on the Editorial Board of Cosmic Search. His Preface to NASA SP-419 draws this conclusion: "As a theologian, I would say that this proposed search . . . is also a search of knowing and understanding God through His works -- especially those works that most reflect Him. Finding others than ourselves would mean knowing Him better."

Those interested in further theological views of ETI might check "Life beyond Earth & the Mind of Man," NASA SP-328. This book is an abridgment of a symposium held at Boston University in 1972, at which Krister Stendahl presented a positive view of SETI. His main argument was that SETI provides a means of gaining a better perspective on our place in the universe, which is consistent with theological goals. As Stendahl put it, "What is interesting for man is to know both his importance and that this importance should not be built up on the basis of illusions of uniqueness and absoluteness."

Technical Feature

Care and Feeding of a SETI Dish

The antenna used in our *Project Argus* prototype, detailed in previous issues of *SearchLites*, suffered from low illumination efficiency and relatively high noise temperature, due primarily to the simple cylindrical waveguide feedhorn employed. The addition of a single choke ring around an existing feedhorn can improve overall system performance by more than 1 dB. The photograph below shows how *Project Argus* pioneer EA3UM added such a choke ring. A suitable design is detailed on our Web site, and is offered commercially by SETI League member Jeffrey M. Lichtman, through his company, Radio Astronomy Supplies (190 Jade Cove Drive, Roswell GA 30075).



Note also how dual feedhorns can be accommodated by mounting one horn slightly offset from the focal point of the dish. This approach skews the antenna pattern slightly, but the result is easily measured by peaking the antenna on sun noise, and compensating aiming accordingly. Such a dual feedhorn design is a viable alternative for those members wishing to use a single dish simultaneously for satellite TV reception and SETI.

Bequest Request

When SETI pioneer Dr. Bernard M. Oliver passed away on Thanksgiving Day, 1995, he left a void which can never be filled. But he also left a permanent legacy. Barney, a gentleman of more than modest means, bequeathed a generous sum to the SETI Institute, the organization which he served so ably during the last several years of his life. Thanks to Barney's generosity and foresight, our colleagues' *Project Phoenix* targeted search continues to survey hundreds of nearby sun-like stars. We wish them every possible success.

There are far too few Barney Olivers in the world and we certainly cannot afford to lose another. Nevertheless, bequests by our members to The SETI League, in any amount, can do as much to assure our long-term viability as Dr. Oliver's estate did for *Project Phoenix*. We urge all members to consider making provisions for The SETI League in their wills, and will apply monies so received to an endowment fund, so the legacy will be truly lasting.

I Wanna Hold Your Hand

by H. Paul Shuch, Executive Director

Participants in our *Project Argus* all-sky survey seem to be divided into two distinct camps: the dedicated experimenters who are anxious to do exactly what we ask of them, no more, no less; and those rugged individualists who refuse to be constrained by any organization or structure. Trying to strike a balance between these two factions is occupying more than a little of your director's time.

For the individualist, I have nothing but the highest regard. From the beginning, the SETI scientist has been the iconoclast, working in a virtual vacuum, fiercely guarding the secret of his or her involvement so as not to compromise scientific credibility. It wasn't until Morrison and Cocconi published their pivotal short paper in *Nature* in 1959, for example, that Frank Drake had any indication that there were others who would regard his work as anything but a wasteful folly. Drake had been preparing his *Project Ozma* targeted search in relative secrecy, knowing how readily he might become the subject of ridicule by his peers.

Drake was, of course, a man ahead of his time. Today, with SETI finally accepted into the scientific mainstream, we need not hide our involvement or apologize for our beliefs. But decades of doubts have left their mark. There are those of our members who want to be left alone to pursue their passion, unconstrained by frequency recommendations, search strategies or organizational structure. And I certainly understand their fear that bureaucracy might stifle the creative spirit. I guard against the kind of heavy-handed management which would leave promising stones unturned, and emphasize that there are no *wrong* frequencies or directions to point. I merely ask that our individualists keep us well-informed. Each must coordinate with his or her fellows so that, should another *Wow!* be detected, we will be in a position to have other members confirm its reception, to verify it beyond reasonable doubt.

At the other extreme are those who want to be told exactly what hardware and software to acquire, how to put it all together, where to point their dish and what frequencies to scan, at what rate, to what resolution. I would like to offer these participants as much hand-holding as they desire, because their dedication and regimentation may well be the key to SETI success. But in offering guidance, I risk offending the individualists. So I strive for balance and risk disappointing those at both extremes.

Right now, it is probably a moot point. With only 24 active stations, we have hardly achieved critical mass. We are, after all, still in the development phase. Since we have too few stations to either achieve significant sky coverage or risk excessive overlap, I have adopted a laissez-faire approach to coordination. For now, I ask our pioneers to build as they see fit, point where they please, tune whatever spectrum strikes their fancy.

The Participant Survey forms and Anomaly Logs found on the Web (and available by mail upon request) are sufficient coordination for the moment. This is the phase of the

project in which we can give the individualists free reign, asking only that they document and share their thoughts and efforts.

In a couple of years, as more stations come on line, we will need to impose more structure to keep our search focused. At some point it will become necessary to assign aiming coordinates, frequencies, and time schedules. The fully deployed, operational phase of any search becomes somewhat boring, but is the phase most likely to yield verifiable results.

Meanwhile, I wanna hold your hand (yeah, yeah, yeah). But only if you ask.

Conference Calendar

SearchLites' readers are apprised of the following conferences and meetings at which SETI-related information will be presented. League members are invited to check our World Wide Web site (www.setileague.org/) under Membership Services and Activities, or email to us at info@setileague.org, to obtain further details. Members are also encouraged to send in information about upcoming events of which we may be unaware.

April 4 - 6, 1997: *Southeastern VHF Conf.*, Marietta GA.

April 15, 1997: *IEEE*, Stevens Inst. of Tech., Hoboken NJ.

April 26, 1997: *Keystone VHF Club*, York PA.

April 26 - 27, 1997: *Trenton Computer Festival*, Trenton NJ.

May 8 - 11, 1997: *High Frontier Conference*, Space Studies Institute, Princeton NJ.

May 16 - 18, 1997: *Dayton Hamvention*, Dayton OH.

May 22 - 26, 1997: *International Space Development Conference*, Orlando FL.

May 23 - 26, 1997: *BayCon '97*, San Jose CA.

May 30 - June 1, 1997: *Rochester Hamfest and ARRL Atlantic Division Convention*, Rochester NY.

July 13 - 16, 1997: *Society of Amateur Radio Astronomers*, NRAO Green Bank WV.

July 24 - 27, 1997: *Central States VHF Conference*, Hot Springs AR.

August 28 - September 1, 1997: *Lonestarcon 2 / 1997 Worldcon*, San Antonio TX.

October 17 - 19, 1997: *AMSAT Annual Meeting and Space Symposium*, Toronto Canada.

October 23 - 26, 1997: *Microwave Update*, Sandusky OH.

November 14 - 16, 1997: *Philcon '97*, Philadelphia PA.

January 21 - 23, 1998: *SETI Conf.*, Sydney Australia.

May 15 - 17, 1998: *Dayton Hamvention*, Dayton OH.

May 29 - 31, 1998: *Rochester Hamfest and ARRL Atlantic Division Convention*, Rochester NY.

July 23 - 26, 1998: *Central States VHF Conference*, Kansas City KS.

August 5 - 9, 1998: *BucCONeer / 1998 Worldcon*, Baltimore MD.

May 14 - 16, 1999: *Dayton Hamvention*, Dayton OH.

September 2 - 6, 1999: *Aussiecon Three / 1999 Worldcon*, Melbourne Australia.

Ask Dr. SETI

Dear Dr. SETI,

First I wish to offer my encouragement to all in the SETI league. In my opinion manned space travel is too inefficient a means to seek out and discover life in and beyond our solar system. Radio astronomy and SETI could accomplish this far sooner and far cheaper.

Isn't SETI in effect a form of "Electromagnetic Archeology"? Shouldn't SETI be respected as such?

My real question (the nagging one) is this: If other life forms think like us and construct transmission equipment and "respect" the water hole frequencies, might we be listening in the wrong place?? Picture their equivalent of the SETI league patiently listening to 1420 MHz while their brothers and sisters are watching cartoons broadcast at high power on other portions of their EM spectrum. Perhaps more attention should be taken to listen on appropriate portions of the spectrum where high power signals could escape an Earth-like atmosphere.

J. L.

The Doctor Responds:

The archeology analogy has been used by Philip Morrison. It is certainly apt. But you raise a very good point. As you might imagine, JL, this question receives quite a bit of attention among SETIphiles. My personal take on it is that while there might indeed be a "right" frequency to listen on, we can only guess as to what it might be. Which means, due to our ignorance, there are no "wrong" frequencies! We encourage SETI League members to scan the Water Hole, yes, but also any other interesting frequencies which strike their fancy. That way, maybe someone will guess right.

By the way, the range of frequencies which we should scan is not limited merely by atmospheric absorption, but also by cosmic noise, synchrotron radiation, and interstellar dispersion. The *Project Phoenix* receivers employed by our friends at the SETI Institute, for example, scan the whole region from 1.2 to 3 GHz. The so-called Microwave Window, the most transparent part of the spectrum, extends all the way from 1 to perhaps 10 GHz. And outside of the Earth's atmosphere, signals up to perhaps 100 GHz are viable. So you can see that there is plenty of spectrum to choose from. May your guess bear fruit!

Send your questions to Ask Dr. SETI, PO Box 555, Little Ferry NJ 07643, or email your questions to askdrseti@setileague.org. Remember, he's not a real doctor (rather, he's the kind who actually has to work for a living!). For health questions, consult a competent medical professional.

Dear Dr. SETI,

I have never been able to get excited about SETI. It is not that I doubt the possible existence of other intelligent beings in space, but it would seem that because of the vast distances involved any possibility of two-way communication is unlikely.

If we did receive some kind of message, could we ever understand it? These beings certainly went through a very different evolutionary process than we did, and their thought patterns might be incomprehensible to us. We have not yet deciphered ancient Etruscan, which was spoken by human beings like us right here on earth.

Some of Dr. Drake's speculations on the possible nature of alien civilizations are pretty far out. I sometimes think that what SETI is really looking for is a father figure out in space who will tell us how to solve our earthly problems of nuclear weapons, overpopulation, and destruction of the environment.

Of course, we know the solutions to these problems. We just lack the will to solve them.

H. H., Tempe AZ

The Doctor Responds:

I fully agree that the vast distances between the stars preclude two-way communications with our cosmic neighbors. But does this negate the value of simplex transmissions? All my life I have been receiving one-way communications which have enhanced my being -- from Moses, Aristotle, Shakespeare and George Bernard Shaw. Because I cannot engage them in a dialog, is the communication any less valid?

Yes, there are challenges to decoding a communication from a race with which we have nothing biologically in common. But translation and interpretation aside, the mere confirmation of the existence of other civilizations can have a profound impact on humanity. If, because we have at least all physical law in common, we do manage to interpret some of the intercepted transmissions, I would consider that a bonus. But existence proof alone is, in my opinion, worth the price of admission.

Father figure? I prefer to think more along the lines of finding a brother figure, or maybe a distant cousin. Though I have never met my cousins in Europe, nor do we speak the same language, I still feel there is a bond between us. Why should it be otherwise with our cosmic cousins?

Frank Drake's speculations as to the nature of alien civilizations are just that -- speculations. But about the nature of photons, we need not speculate. They are indeed the fastest spaceships known to man, and stand a far better chance of traversing the distance between stars than do alien visitors, be they benevolent or malevolent. Further, they are the substance of ham radio communications, and hams are in a unique position to exploit them for the good of all humanity.

SETI Reply Protocols Proposed

Last year, in *SearchLites* Vol. 2 Number 3, Summer 1996, we reproduced the SETI Verification Protocols established by the International Academy of Astronautics' SETI Committee in 1989. The SETI League, Inc. supports compliance with these protocols, which say, in effect, "Verify your results, and then *tell everybody!*" Somewhat more controversial is the question of whether, when, and how to reply to reception of a valid intelligent alien communication. We touched on this matter briefly in the *Ask Dr. SETI* column in the last *SearchLites*, mentioning a set of international protocols under consideration by that same IAA committee.

At present, the IAA recommendations are far from finalized. The lively debate afoot within the SETI community has been very well summarized in Volume 8 Number 3 of *Bioastronomy News*, the newsletter of IAU Commission 51, published by The Planetary Society.

As was emphasized in that newsletter, the committee's proposals are being circulated specifically to stimulate discussion about sending communications to extraterrestrial civilizations. So that SETI League members might participate in that ongoing dialog, we have reproduced below the nine steps of the IAA SETI Committee's principles about "whether and how humankind should send a communication to extraterrestrial intelligence."

1. *International consultations should be initiated to consider the question of sending communications to extraterrestrial civilizations.*

2. *Consultations on whether a message should be sent, and its content, should take place within the Committee on the Peaceful Uses of Outer Space of the United Nations and within other governmental and non-governmental organizations, and should accommodate participation by qualified, interested groups that can contribute constructively to these consultations.*

3. *These consultations should be open to participation by all interested States and should be intended to lead to recommendations reflecting a consensus.*

4. *The United Nations General Assembly should consider making the decision on whether or not to send a message to extraterrestrial intelligence, and on what the content of that message should be, based on recommendations from the Committee on the Peaceful Uses of Outer Space and from governmental and non-governmental organizations.*

5. *If a decision is made to send a message to extraterrestrial intelligence, it should be sent on behalf of all Humankind, rather than from individual States.*

6. *The content of such a message should reflect a careful concern for the broad interests and well-being of Humanity, and should be made available to the public in advance of transmission.*

7. *As the sending of a communication to extraterrestrial intelligence could lead to an exchange of communications separated by many years, consideration should be given to a long-term institutional framework for such communications.*

8. *No communication to extraterrestrial intelligence should be sent by any State until appropriate international consultations have taken place. States should not cooperate with attempts to communicate with extraterrestrial intelligence that do not conform to the principles of this Declaration.*

9. *In their deliberations on these questions, States participating in this Declaration and United Nations bodies should draw on the expertise of scientists, scholars, and other persons with relevant knowledge.*

The most controversial of these recommendations, as far as The SETI League is concerned, appears to be Principle 8. In fact, sociologist Dr. Donald E. Tarter, who sits on the IAA SETI Committee, argues "that the SETI Community should reconsider the wisdom of principle 8 of the SETI guidelines." There is certainly no inherent technological limitation which would prevent a dedicated amateur from receiving a transmission from an extraterrestrial civilization. In fact, this is the underlying principle of amateur SETI in general, and The SETI League's efforts in particular. Similarly, it would be virtually impossible to prevent a dedicated amateur from replying to such a transmission, once received.

It has been argued that only governments possess the technology necessary to beam a directed response. On the other hand, reciprocity principles suggest that any civilization advanced enough to transmit a signal which amateurs can receive, would have technology adequate to receive our replies. Whether SETI League members or other amateurs would, or should, respond, is another matter. We solicit the opinions of the membership.



SETI Email Reflector Established

SETI League member Bob Cutter (KI0G) has very kindly set up an unmoderated SETI email reflector on his Internet server. The SETI League is still actively working on achieving listserv capability on its own server, and eventually hopes to host several closed lists for its various committees. Meanwhile, Bob's list provides yet another medium of communications for our members.

Although this is *not* an official SETI League reflector, all SETI League members have been invited to utilize this service. To subscribe, send an email to Major-domo@sni.net, with "subscribe seti" in the body. Users are asked to keep posts short, to the point, respectable, and on topic.

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