

Conference Calendar

Further details on these upcoming conferences may be found at <http://www.setileague.org/general/confnrc.htm>.

* - SETI League participation confirmed

June 7 - 12, 1998: *IEEE MTT-S International Microwave Symposium*, Baltimore MD.

June 19 - 21, 1998: *Jersey Starquest*, Hope NJ.

* **July 12 - 15, 1998:** *Society of Amateur Radio Astronomers*, NRAO Green Bank WV.

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

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

August 8 - 9, 1998: *8th International EME Conference*, Paris France.

August 21 - 23, 1998: *24th Eastern VHF/UHF Conference*, Enfield CT.

September 28 - October 2, 1998: *International Astronautical Congress*, Melbourne Australia.

September 28 - October 7, 1998: *IARU Region 2 Triennial Meeting*, Caracas Venezuela.

October 3, 1998: *Mid Atlantic VHF Conf.*, Horsham PA.

* **October 16 - 18, 1998:** *16th AMSAT Annual Meeting and Space Symposium*, Vicksburg MS.

October 25 - 27, 1998: *Microwave Update*, Longmont CO.

* **November 8, 1998:** *Martlesham Microwave Roundtable*, England.

November 12 - 15, 1998: *Molecular Nanotechnology Conference*, Santa Clara CA.

November 13 - 15, 1998: *Philcon '98*, Philadelphia PA.

* **April 2 - 4, 1999:** *Balticon 33*, Baltimore MD.

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

August 2 - 6, 1999: *6th Bioastronomy Conference*, HI.

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

May 12 - 14, 2000: *ARRL National Convention and Dayton Hamvention*, Dayton OH.

September, 2000 (date pending): *European Radio Astronomy Club International Convention*, Heppenheim Germany.

August 7 - 19, 2000: *XXIVth International Astronomical Union General Assembly*, Manchester University, UK.



**433 Liberty Street
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SearchLites

**the Quarterly Newsletter
of The SETI League, Inc.
Volume 4 Number 3
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English Volunteers Receive SETI League's 1998 Bruno Award

LITTLE FERRY, N.J., April 21, 1998 -- The SETI League, Inc., leaders in the privatized Search for Extra-Terrestrial Intelligence, has awarded its highest honor to two radio amateurs from England. Ken Chattenton and Trevor Unsworth, who were the grass-roots group's first two volunteer Regional Coordinators, received the coveted Giordano Bruno Memorial Award for their contributions to amateur radio astronomy. The award was announced at the nonprofit science group's annual meeting in New Jersey in March.

Three years ago at a conference in Scotland, SETI League executive director Dr. H. Paul Shuch was approached by Chattenton (G4KIR) and Unsworth (G0ECP), two enthusiastic radio amateurs who wanted to know how they could help build up SETI League activity in their native England. The SETI League was then a small US-based group made up primarily of amateur radio enthusiasts. It was clear that the organization could not contemplate mounting a scientifically significant SETI effort without extensive international cooperation. Ken and Trevor noted that The SETI League had neither the staff nor the resources to coordinate such a global search unaided. They then volunteered their considerable talents and energies to coordinating SETI League activity throughout the UK. Their success can be measured in part by the large number of radio, television, newspaper and magazine interviews they have granted during the past three years. But a better measure is the phenomenal growth in amateur SETI participation throughout the UK since Ken and Trevor stepped forward. Britain's SETI League contingent is now second in size only to that in the United States.

The English model for local involvement served as the basis for the current SETI League volunteer Field Organization. Ken and Trevor were the first of a network which has now grown to about forty regional coordinators on six continents, supporting an expanding membership base. The SETI League owes its current international profile in no small part to the vision and energies of these two dedicated volunteers.

The awards were presented by SETI League secretary Heather Wood at a press conference in Stockton-on-Tees, England, on April 21 1998, the second anniversary of the launch of the league's *Project Argus* search.

Editorial

Where Are The SETI Police?

by H. Paul Shuch, Executive Director

Of all the policies adopted by the Trustees of The SETI League to ensure scientific rigor, none has proved more controversial than the one stating no *Project Argus* participant should publicly disclose any signal detections until they have been independently verified by another participant. The reasoning behind the policy is simple: in statistical analysis, sample size is critical. When $n=1$, all bets are off. We learned from the Ohio State "Wow!" signal that an event which does not repeat and cannot be verified is no existence proof whatever. Science demands peer review, and in our case the panel of peers is comprised of our hundreds of observers around the world, all coordinating their observations and correlating their findings via the Internet.

Remember Cold Fusion? About ten years ago, two chemists in Utah thought they had sustained a fusion reaction at room temperature. After an exuberant press conference, a flurry of scientific papers and presentations, and the concerted efforts of physicists and chemists around the world, it appeared that their results could not be duplicated. To be sure, they had discovered something. Just what, we still can't say (it may have even been cold fusion), but if a discovery cannot be independently verified, it has little scientific merit. It's clear that Pons and Fleishman tarnished their reputations by premature disclosure of their work. And these were trained professional scientists!

So what could be wrong with waiting for confirmation before making an announcement? Many of our members feel the Detection Protocols adopted last year somehow impinge upon their personal liberties. Especially in the US, but elsewhere to be sure, a strong tradition of freedom of expression suggests that nobody tell anyone else what he or she can or cannot say, or to whom. The conspiracy theorists, many of whom are sure that NASA SETI discovered positive signs of life prompting Congress to shut them down, are concerned that The SETI League may become party to some grand cover-up scheme. Then, there is the fear that someone's proprietary findings might somehow be usurped, that those making great discoveries may somehow be denied their due. At the extreme of this line of reasoning is the fear of one's rightfully earned Nobel Prize, or other significant recognition, going to someone else.

I fully realize that my simply telling you these concerns are groundless may do little to dispel them. But, in fact, they are. Ours is a grand, grass-roots effort, perhaps unparalleled in the annals of science. The SETI League makes no proprietary claims to anyone's efforts. There are no SETI Police to arrest you if you violate the Protocols. Nobody's membership is going to be revoked for excessive exuberance. We are not here to restrict anyone's freedoms. What we are trying to do is urge restraint and reasonable scientific rigor. Without them, we risk becoming a laughingstock, and any real discoveries made by our members being rejected by the scientific mainstream.

Ask Dr. SETI

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

Dear Dr. SETI:

Can someone please inform me of what is the required surface accuracy for a 3m dish? Also, which material is superior for a dish: fiberglass or metal?

Phil, Australia

The Doctor Responds:

The rule of thumb for any parabolic reflector is that the surface inaccuracies should not exceed a tenth of a wavelength at the operating frequency. If, for example, you are going to search at the hydrogen line (21 cm), that means you cannot deviate from the parabolic curve by more than 2 cm at any point. (That's not too difficult a tolerance to hold, which is why some L-band dishes are made out of hardware cloth or poultry wire.)

We have people searching at much higher frequencies; their tolerance is correspondingly tighter. For example, at 10 GHz, the wavelength is 3 cm, so the dish has to be accurate to 3 mm. (This is compatible with a window-screen surface, but be sure to use copper, not plastic, screening!) And at 24 GHz (1.25 cm wavelength), it's necessary to keep all points on the surface of the dish accurate to within about a millimeter, to achieve full-rated antenna gain. So, you see it's easier to achieve reasonable antenna performance at the lower SETI frequencies.

Dish material doesn't much matter, as long as it's RF reflective. It's normally a matter of what's available and what materials you're skilled to work with. But bear in mind that fiberglass-structure dishes still need a metallized reflector surface -- this is often sprayed on over the fiberglass.

Dear Dr. SETI:

I have just seen the movie Contact, and now have some interest in SETI. Reading about Project Argus, it seems earthlings are fine tuning their equipment for certain radio signals; are we sending out any of these perfect fine tuned signals ourselves? Is there something somewhere which is sending out bleeps in prime numbers in these settings which we hope another advanced civilization will be optimized to pick up?

You write "Let us hope that either nature, or other civilizations, will provide us with other interesting signals of like amplitude, and sufficiently narrow bandwidth" (from Project Argus and the Challenge of Real-Time All-Sky SETI). Are we doing this for other civilizations ourselves?

Thank you, Jon (age 15)

The Doctor Responds:

Your question shows insight and maturity beyond your years, Jon; you are to be commended. The short answer is, only once, so far. That was the Arecibo Interstellar Message, discussed in the previous *SearchLites* (and available on the Internet.)

Remember, though, that if you transmit and wait for a response, you may have to wait a very long time (in fact, twice the distance between us and the responding civilization). One advantage of starting out receiving is that signals sent thousands of years ago may just now be reaching our planet.

You should also note that it's far cheaper to receive than it is to transmit. We are a young civilization just developing its technology. One would expect the more mature civilizations (of which we hope for an abundance) to shoulder the task of building the high-power beacons. Once we've received one, I imagine it will contain instructions for building not a transport machine, but rather our own beacon transmitter!

I am gratified by one incidental aspect of your question. In asking whether we are transmitting such signals for "another advanced civilization," you seem to take their existence as a given. In that respect, your generation is light-years ahead of mine. By your reasoning, contact would seem no longer a matter of if, but of when. Let us hope you are right.

Dear Dr. SETI:

What is the hydrogen line, and why are radio or RF transmissions prohibited at this frequency? Thanks for any info.

Chris, Florida

The Doctor Responds:

The hydrogen line (1420.40575 MHz) is the precession frequency of neutral hydrogen atoms, the most abundant substance in space. It happens to fall in the quietest part of the radio spectrum, what's known as the Microwave Window. Although there may not seem to be a lot of loose hydrogen atoms about (there's perhaps one per cubic centimeter of interstellar space), the interstellar medium contains a lot of cubic centimeters. So, these individual atoms chirping away at 1420 MHz make a powerful chorus, which is readily detected by even small radio telescopes.

Hydrogen line radiation was first detected by Harvard grad student Harold Ewen and his professor, Edward Purcell, in 1951. Their instrumentation, a simple waveguide horn antenna about a meter across driving a crude diode mixer, is now on display at the National Radio Astronomy Observatory (NRAO), Green Bank WV. It's also been memorialized in song (see *Sing a Song of SETI*, the official songbook of The SETI League.)

Why is the hydrogen line protected spectrum? It's a great frequency for observing the structure of the universe, and some of the best and most detailed Milky Way radio maps have been made on the hydrogen line. It is probably the world's most popular radio astronomy frequency, and the International Telecommunications Union (ITU) has the good sense to protect it.

In 1959 two scholars (Philip Morrison at Cornell University and Frank Drake at NRAO) independently recognized that the hydrogen line would be a likely frequency for interstellar beacons. They reasoned that more advanced civilizations would reason that young civilizations (like ours) might already be listening there. Based upon that circular reasoning, Morrison went on to co-author the world's first modern SETI article ("Searching for Interstellar Communications," in *Nature*), and Drake conducted the first modern SETI study,

"Project Ozma," a hydrogen line search of two nearby Sun-like stars for possible artificial signals.

Over the past forty years, about three dozen other hydrogen line searches have been conducted. It was on the hydrogen line that in 1977 the Big Ear radio telescope at the Ohio State Radio Observatory detected the so-called "Wow!" signal, the most promising, intriguing and beguiling SETI candidate signal to date. The "Wow!" is also the best known SETI signal, having been featured in the "X-files." After about 100 follow-up attempts over a twenty-year period, that signal has never repeated and remains unexplained.

Guest Editorial:

A Two-Way Street

by Robert W. Casey (rcasey@wenet.net)

Communication is a two-way street; even TV is becoming interactive after fifty years. This principle, by definition, will come to apply to intra-galactic communication with virtual timeless consciousness. We are in the extreme early stages of communication within the Galaxy and have encountered barriers to the two-way principle in the minds of those who fear that by reaching outwards the world will in some way bring disaster upon itself.

The selection of the so-called Water-Hole frequency band for listening carries with it a certain reciprocal implication. Water is life's basic ingredient. We assume naturally that life in the galaxy will involve water. The wavelengths for broadcasting in the Galaxy are virtually infinite. One expects that minds will have much in common, that highly evolved intelligence seeking to reach out will select first a band common to biological life. Isn't the assumption by those thinkers that intelligence sufficiently advanced to listen will have reached the same conclusion? The broadcaster has evolved further than just the listener. The broadcaster has envisioned the Galaxy as a forming "brain" connecting up its mature planetary neurons from many enlightened areas, until the whole is alight with timeless consciousness.

What we hope to hear in the "Water-Hole" is a deliberate message. Isn't it apt to suggest that we are one in a Cosmic whole in a continuum? Since "we are not alone," doesn't it follow that as beings seeking a connection, we might begin to drop our early fears and begin to take the maturing and positive step towards planning to reciprocate with a transmission?

We have seen the metamorphosis from analogue to digital while the Information Age continues an exponential development. The concept of SETI can take several swift evolutionary steps now. The SETI League should expand its mission to seek internally a preliminary set of parameters for the content of Earth's first transmissions. We must educate those concerned in the world about SETI, and help them to overcome any fear of negative consequences. We should circulate among our international colleagues preliminary parameters, and promote a conference to orchestrate our planet's first tentative steps toward maturity.

The latter step might be greatly furthered by soliciting thoughts at the outset from other SETI enthusiasts. Who better than The SETI League to adopt a leadership role in this global effort?

Technical Feature

Kit Update

Efforts to provide SETI League members with a low cost Water Hole receive system are progressing. The project has been broken down into three distinct phases, as follows:

Phase I: low-noise preamplifiers covering the entire Water Hole region.

Phase II: a no-tune microstrip down-converter, to shift the Water Hole into the HF or VHF spectrum.

Phase III: cylindrical waveguide feedhorns, for use with Satellite TV dish antennas.

Phase I Progress to Date:

The SETI League has entered into an agreement with noted component supplier Down East Microwave Inc., whereby DEM will supply microwave radio astronomy and SETI hardware designed by The SETI League, in both kit and assembled form. Discounts are offered to SETI League members. A SETI League-designed preamp module (DEM model SETI-LNA) has been available since late 1995 and is in use by numerous SETI League members worldwide. Kits start at \$75, with assembled and tested units selling for \$105.

Phase II Progress to Date:

First out of the starting gate with a stable, low-noise down-converter for the 21 cm band was SSB Electronic GmbH of Germany. Their Model UEK-21 downconverter was developed in cooperation with Peter Wright, our own volunteer coordinator for Germany. The unit converts two MHz of spectrum centered on the 1420 MHz hydrogen line, down to a 28 - 30 MHz intermediate frequency. The 10 meter IF is compatible with most members' existing SSB communications receivers. The UEK-21 is priced around 400 DM.

Radio Astronomy Supplies of Roswell GA, which is run by SETI League member Jeffrey Lichtman, has for some time offered its Ultra radio-telescope systems. They incorporate a downconverter to shift the hydrogen line to a 70 MHz IF. Jeffrey has recently added a 70-to-28 MHz "SETI Ready" converter box to his product lineup, which, along with a suitable HF receiver, will allow the Ultra to do double duty as a SETI receiver. Prices were not yet available at this writing.

And finally, a new SETI League downconverter demonstrated at our 1998 Annual Meeting shifts a 4 MHz segment near the hydrogen line down to the 2 meter (144 MHz) ham band. At the Southeastern VHF Conference last year, the prototype measured 49 dB of conversion gain at 1.85 dB noise figure. It shows 50 dB image rejection and better than 30 dB spurious rejection. The unit is now offered commercially by Down East Microwave Inc., in both kit and assembled form. Kits start at \$135 US, with assembled and tested units selling for \$195 US, plus shipping and handling. An additional discount is extended to SETI League members in good standing -- write to SETI League headquarters for details.

Phase III Progress to Date:

SETI League engineers last year completed an improved feedhorn design, which is being offered commercially by Radio Astronomy Supplies of Roswell GA. Owner Jeffrey Lichtman is offering his fellow SETI League members a discount off the \$160 list price. Write for details.

Hollywood Focus:

Contact's Oscar Nomination

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(lklaes@learningco.com)

The film *Contact* has been nominated for Best Sound for the Academy Awards Oscars...and that is all.

I am underwhelmed.

I thought at the very least Jodie Foster would get a Best Actress nomination for her portrayal of astronomer Ellie Arroway. I guess *Contact* happened too far back in the distant year of 1997 for Academy judges to remember it much.

And I am sure the Academy felt that someone else should get a chance for the little golden statue, seeing as Jodie has won it before. But somehow that didn't stop Jack Nicholson from being placed in the running again, for a record eleventh time.

Ironically, though, *Men in Black*, which came out just days before *Contact* in early July, received three Oscar nominations: For Best Art Direction, Best Original Musical or Comedy Score (Danny Elfman), and Best Makeup.

The other films of 1997 featuring aliens, *The Fifth Element* and *Starship Troopers*, received nominations for Best Sound Effects Editing and Best Visual Effects, respectively. None of these films, however, treated the concept of extraterrestrial intelligence with any serious level of scientific accuracy. Certainly not near the level of *Contact* or two other great films of this genre, *2001: A Space Odyssey* (1968) and *The Andromeda Strain* (1971). Not that Hollywood cares so long as the money keeps pouring in from non-discriminating audiences.

As a capper, *Contact* did not win any Golden Globe Awards, but *The X-Files* did win for Best Television Drama. See a trend here?

I realize that the Oscars are really just another way for Hollywood to congratulate itself for making lots of money again on live television to billions of viewers all over the planet Earth (and probably beyond). I am sad that *Contact* did not win, not only because it deserved to in at least several categories (you think any of those other films I mentioned put the thought and effort to accuracy that *Contact* did, not to mention a most meaningful message?), but because it will not receive the extra publicity it deserved to further spread Carl Sagan's words to humanity. When *Apollo 13* was nominated for Best Picture in 1995, it gained important recognition for space exploration even though it did not win, just by being recognized by the Academy. Ironically, *Apollo 13* was also released in July.

The kind of award that *Contact* was nominated for, Best Sound, is usually the time when most viewers are making a snack, taking a bathroom break, or sleeping until the big awards arrive. And can anyone even tell me why *Contact* was placed in this category and not any others?

Perhaps what matters are the people who will make the effort to see *Contact* and learn some valuable lessons from it. I am curious: Have other SETI League members encouraged others to see *Contact*, especially those who normally would not bother with such a film? And what were the reactions to their seeing it?

Dialog:

The Secret of 70 Virginis

by H. Paul Shuch, Executive Director

One of the persistent rumors circulating on the Internet, a myth that just won't go away, is the allegation that SETI has received signals from the direction of 70 Virginis. 70Vir is a Sun-like star which we now know to have at least one planet, possibly in the habitable zone. It's claimed that we're hiding this knowledge from the public. In the interest of dispelling that myth, I reproduce below an email dialog between myself and an interested, though skeptical, SETI League member:

Someone in England said "SETI has received some radio signals from Virginis70." Is there anything to this statement?

That British news quote was a prime example of something taken out of context by journalists who don't fully understand the science they're reporting. The short answer is "no." The long answer is:

When the planet at 70Vir was discovered, Dan Werthimer of U.C. Berkeley SERENDIP project commented (it was at the January 1996 AAAS meeting in Baltimore, as I recall) that SERENDIP had already looked closely at 70Vir at 435 MHz, and all the signals detected were statistically consistent with background noise. "Aha!" must have thought the journalist, "Signals HAVE been detected!" That's what got reported, and keeps surfacing. No signals, folks, just noise. (But that doesn't mean we shouldn't keep looking.)

By the way, when I've related this incident at conferences, I've been labeled "part of the Government cover-up"!

What UK publication broke the Virginis/SETI story? Mainstream?

A mainstream newspaper, NOT a tabloid. Sorry, I don't recall which one.

Does Dr. Paul Butler, U.C. Berkeley, have input into the SETI agenda in conjunction with the search for extrasolar planetary search? How does this work? Does SETI ever cue Dr. Geoff Marcy and Dr. Paul Butler to look in regions where anomalous signals have been detected? Which comes first, the signal or the planet?

The planet, where there's any coupling whatever, but the two generally operate independently. SETI candidate signals usually cannot be associated with a single, specific star; the beamwidths of the antennas are too broad. (Even the Big Ear radio telescope at Ohio State University, one of the narrowest, has about five stars within its field of view at any given time.) Since interesting signals can generally be narrowed down only to a general region, we don't provide much input to the planet hunters. And since they already know which nearby stars are most Sun-like and of the right age, mass, temperature combination to form planets, they don't really need our input. As it happens, the star catalogs used by the targeted search SETI folk and the planet hunters have a good deal of overlap anyway.

On the other hand, when confirmed planets are announced, we do one of two things:

1. review data for past observations of the region of the sky containing that particular star,
2. absent such past observations, we take a look.

"We," in this case, is those doing targeted searches. The SETI League is engaged in an all-sky survey. See <http://www.setileague.org/general/whatsurv.htm> for an explanation of the two complimentary strategies.

Joe McNally wrote in Fortean Times Magazine, "Soon after the planet's discovery was announced, SETI (the search for extra terrestrial intelligence) ran a quick check on their records, and discovered a number of anomalous signals coming from the direction of 70 Virginis."

They failed to print the rest of the sentence: "which were consistent with noise!" I love it when things are taken out of context, don't you?

What is Dan Werthimer's role; i.e., what is the mission of SERENDIP?

Dan is a faculty member at University of California, Berkeley, in charge of coordinating SERENDIP. See <http://sag-www.ssl.berkeley.edu/serendip> for an overview of SERENDIP's mission.

Does SERENDIP work hand-in-hand towards finding remote planets?

No, SERENDIP is a parasitic SETI program (see their website), so they don't get to choose their targets.

You indicate that SETI will continue to scan 70 Virginis. What is the objective, or why the additional curiosity?

SERENDIP IV at Arecibo runs at a different frequency than SERENDIP III, so repeat looks at previously scanned targets would be standard procedure.

How are anomalous signals CONSISTENT with noise? I don't understand. What is the usual, what isn't?


Everything that's at a temperature above absolute zero generates radio signals. These are natural signals (noise), NOT artificial or created by intelligent beings. You can see such thermal noise by turning on your TV to an unused channel -- it looks like a snowstorm. You would receive such signals from any star. (In fact, if you watch satellite TV, you will notice that twice a year, at the equinoxes, you receive interference from our own Sun, as it aligns with the geosynchronous satellite belt. That signal is surely not intelligently generated.) You do statistical analysis on all signals to see if there's anything artificial buried in them. In the case of 70Vir, there wasn't. Although it's easily detected, noise is not a "signal" in the sense of being evidence of ETI.

Now I had intended to put this myth to rest, not make a career of it, so this will have to suffice. Thanks for your interest.


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