



SearchLites

Vol. 17 No. 1, Winter 2011

The Quarterly Newsletter of The SETI League, Inc.

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Six Degrees of SETI Separation by H. Paul Shuch, Executive Director Emeritus

How can one possibly associate the Space Shuttle with SETI? It's a long, convoluted path, so stay with me.

I'm sure every space enthusiast of appropriate age remembers exactly what he or she was doing when the Challenger shuttle exploded - it's one of those pivotal moments in history that's indelibly etched in our memory banks. Following that disaster, a panel of experts was convened to investigate. The person on the Rogers Commission who first figured out, and then demonstrated, the connection between low temperatures and O-ring deformation was CalTech professor Richard Feynman. That brilliant physicist and Nobel laureate (like many brilliant American physicists of his generation) had spent the years of World War II at Los Alamos, NM, developing the first atomic bomb. There he worked for Enrico Fermi, best known to the SETI community for the famous Fermi Paradox -- but I digress.

I remember reading, in a volume of Feynman's memoirs in the late 1980's, a passing reference to someone named Tukey, whom he had known in grad school at Princeton. The name rang a bell, so I went back to a book given me by my uncle, the late Bayesian statistics authority Ward Edwards of USC, when I was in grad school. The title was *Exploratory Data Analysis*, and the author was John Tukey, a noted statistician at Princeton. The very same Tukey of whom Feynman wrote. (That book informed and inspired some of the analysis tricks I employed in my doctoral dissertation -- but I digress.)

It was Tukey, I later learned, who had developed the Fast Fourier Transform (FFT), the algorithm which has been, until recently, the primary signal analysis tool of observational SETI. I first learned about the FFT in a landmark textbook on the Fourier Transform, written by Ron Bracewell of Stanford. Bracewell was an Australian radio astronomer who co-authored the very first radio astronomy textbook, and later became very involved in SETI research -- but I digress.

One of the things that motivated Bracewell's interest in SETI, it turns out, was the seminal article *Searching for Interstellar Communications*, by Cocconi and Morrison. Phil Morrison, as I'm sure you know, went on to become the father of modern SETI science, and a mentor to many SETIzens, including me. He was also a veteran of the Manhattan Project at Los Alamos, and somewhere along the line also got to know Tukey. Interestingly, Morrison, Feynman, and quite a few other Los Alamos scientists went on to become staunch pacifists, and proponents of nuclear disarmament. (But I digress.)

I could go on (digressing), but I think you can see the pattern here. From Challenger to Feynman to Tukey to Bracewell to Morrison, it all points to SETI. It's a case of convergent influences, quite common to all intellectual pursuits, and I'm sure you've seen similar connections elsewhere. The point is, SETI is so highly interdisciplinary a field of study that you can get there from just about any conceivable starting point. And, from wherever you started, you arrived at this page for a reason. SETI science needs your skills and background, whatever they may be.

But, I digress.



Event Horizon

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 *Event Horizon*, 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.

March 18 – 20, 2011: *Lunacon 2011*, Rye Brook NY.

April 11 - 15, 2011: 18th IAA *Humans in Space Symposium*, Houston, TX.

April 2 – 3, 2011: *Trenton Computer Festival*, Ewing NJ.

April 16, 2011, 0000 UTC - 2359 UTC: Twelfth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 17 - 22, 2011: *Third International Conference on Advances in Satellite and Space Communications*, Budapest, Hungary.

April 24, 2011: Seventeenth SETI League *Annual Membership Meeting*, Little Ferry NJ.

May 27 – 30, 2011: *Balticon 45*, Hunt Valley MD.

Late June, 2011 (date to be announced): *Third IAA Symposium on Searching for Life Signatures*, St. Petersburg, Russia.

August 17 - 21, 2011: *Renovation 69th World Science Fiction Convention*, Reno NV.

October 3 - 7, 2011: *62nd International Astronautical Congress*, Cape Town, South Africa.

November 18 - 20, 2011: *Philcon 2011*, Cherry Hill, NJ.

April 21, 2012, 0000 UTC - 2359 UTC: Thirteenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 22, 2012: Eighteenth SETI League *Annual Membership Meeting*, Little Ferry NJ.

August 30 – September 3, 2012: *Chicon 7 World Science Fiction Convention*, Chicago IL.

September 2012 (dates TBA): *Sixth International Congress for Radio Astronomy*, Medicina, Italy.

October 1 - 5, 2012: *63rd International Astronautical Congress*, Naples, Italy.

April 20, 2013, 0000 UTC - 2359 UTC: Fourteenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 21, 2013: Nineteenth SETI League *Annual Membership Meeting*, Little Ferry NJ.

October, 2013 (dates to be announced): *64th International Astronautical Congress*, Beijing, China.

April 19, 2014, 0000 UTC - 2359 UTC: Fourteenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 20, 2014: Twentieth SETI League *Annual Membership Meeting*, Little Ferry NJ. ❖

SETI League Embraces New International Protocols

Prague, Czech Republic, 2 October 2010 -- What exactly should scientists do in the event of a detection of evidence of extraterrestrial intelligence?

This question has long been a topic for discussion and debate, and has, since 1989, been the subject of international protocols. But the Declaration of Principles Concerning Activities Following the Detection of Extraterrestrial Intelligence (more simply known as the SETI protocols) has become an outdated document in the two decades following its adoption by the International Academy of Astronautics (IAA). On Thursday, 30 September 2010, the IAA SETI Permanent Study Group adopted simplified and revised SETI Protocols, which better reflect the realities of current technology.

Today, by email vote of its Board of Trustees, the non-profit, membership-supported SETI League (which had been signatory to the original SETI Protocols) became the first scientific organization to embrace the newly revised document. "The advent of the Internet has changed the way the world does collaborative science," notes Prof. H. Paul Shuch, the grassroots scientific group's Executive Director Emeritus. "The revised IAA SETI Protocols better reflect this reality, and provide a workable means for honoring both scientific integrity and the public's right to know."

The new SETI Protocols are reproduced elsewhere in this Newsletter. They stipulate that SETI activities are to be conducted with both scientific rigor and total public transparency. Although the provisions of the Protocols are not binding upon individual scientists or the organizations they represent, it is expected that they will be widely embraced, as were the provisions of the predecessor document, by the worldwide SETI community. The SETI League is proud to be the first signatory to this important international agreement.

Largely using radio telescopes and optical telescopes, SETI scientists seek to determine whether humankind is alone in the universe. Since Congress terminated NASA's SETI funding in 1993, The SETI League and other scientific groups have privatized the research. Amateur and professional scientists interested in participating in the search for intelligent alien life, and citizens wishing to help support it, should email join_at_setileague_dot_org, check the SETI League Web site at <http://www.setileague.org/>, send a fax to +1 (201) 641-1771, or contact The SETI League, Inc. membership hotline at +1 (800) TAU-SETI. Be sure to provide us with a postal address to which we will mail further information. The SETI League, Inc. is a membership-supported, non-profit [501(c)(3)], educational and scientific corporation dedicated to the scientific Search for Extraterrestrial Intelligence.



Declaration of Principles Concerning the Conduct of the Search for Extraterrestrial Intelligence

Preamble

The parties to this declaration are individuals and institutions participating in the scientific Search for Extraterrestrial Intelligence (SETI). The purpose of this document is to declare our commitment to conduct this search in a scientifically valid and transparent manner and to establish uniform procedures for the announcement of a confirmed SETI detection. This commitment is made in recognition of the profound scientific, social, ethical, legal, philosophical and other implications of a SETI detection. As this enterprise enjoys wide public interest, but engenders uncertainty about how information collected during the search will be handled, the signatories have voluntarily constructed this declaration. It, together with a current list of signatory parties, will be placed on file with the International Academy of Astronautics (IAA).

Principles

1. *Searching:* SETI experiments will be conducted transparently, and its practitioners will be free to present reports on activities and results in public and professional fora. They will also be responsive to news organizations and other public communications media about their work.

2. *Handling candidate evidence:* In the event of a suspected detection of extraterrestrial intelligence, the discoverer will make all efforts to verify the detection, using the resources available to the discoverer and with the collaboration of other investigators, whether or not signatories to this Declaration. Such efforts will include, but not be limited to, observations at more than one facility and/or by more than one organization. There is no obligation to disclose verification efforts while they are underway, and there should be no premature disclosures pending verification. Inquiries from the media and news organizations should be responded to promptly and honestly. Information about candidate signals or other detections should be treated in the same way that any scientist would treat provisional laboratory results. The Rio Scale, or its equivalent, should be used as a guide to the import and significance of candidate discoveries for the benefit of non-specialist audiences.

3. *Confirmed detections:* If the verification process confirms – by the consensus of the other investigators involved and to a degree of certainty judged by the discoverers to be credible – that a signal or other evidence is due to extraterrestrial intelligence, the discoverer shall report this conclusion in a full and complete open manner to the public, the scientific community, and the Secretary General of the United Nations. The confirmation report will include the basic data, the process and results of the verification efforts, any conclusions and interpretations, and any detected information content of the signal itself. A formal report will also be made to the International Astronomical Union (IAU).

4. All data necessary for the confirmation of the detection should be made available to the international scientific community through publications, meetings, conferences, and other appropriate means.

5. The discovery should be monitored. Any data bearing on the evidence of extraterrestrial intelligence should be recorded and stored permanently to the greatest extent feasible and practicable, in a form that will make it available to observers and to the scientific community for further analysis and interpretation.

6. If the evidence of detection is in the form of electromagnetic signals, observers should seek international agreement to protect the appropriate frequencies by exercising the extraordinary procedures established within the World Administrative Radio Council of the International Telecommunication Union.

7. *Post Detection:* A Post-Detection Task Group under the auspices of the IAA SETI Permanent Study Group has been established to assist in matters that may arise in the event of a confirmed signal, and to support the scientific and public analysis by offering guidance, interpretation, and discussion of the wider implications of the detection.

8. *Response to signals:* In the case of the confirmed detection of a signal, signatories to this declaration will not respond without first seeking guidance and consent of a broadly representative international body, such as the United Nations.

Unanimously adopted by the SETI Permanent Study Group of the International Academy of Astronautics, at its annual meeting in Prague, Czech Republic, on 30 September 2010.

These revised and streamlined Protocols are intended to replace the previous document adopted by the International Academy of Astronautics in 1989. ❖

Ask Dr. SETI ®

Signal from a Habitable Planet?

Dear Dr. SETI:

I have been told that a SETI candidate signal analyzed by Dr. Ragbir Bhathal in Australia came from the vicinity of Gliese 581g, a recently discovered Earth-like planet. Is there any truth to this?

Joe S.

The Doctor Responds:

Well, Joe, yes and no. Ragbir's telescope was indeed pointed in the vicinity of the star Gliese 581, when a potential (though inconclusive) SETI candidate signal was detected. But, "vicinity" was probably the wrong word to choose. "General direction of" would be more apt. This does not necessarily mean the signal was coming from the newly discovered planet (or, in fact, from any of the five previously discovered planets orbiting that particular star -- or even from the general neighborhood of that star!)

Consider that the Milky Way galaxy contains 400 billion stars, more or less. Consider that the largest radio telescope on Earth, the Arecibo Observatory, can view only one part in 16 million of the sky at any given time. Divide the one number by the other, and you can see that, for any observation, there are, on average, about 25 thousand stars within its field of view -- most of which are (a) invisible to us on Earth, and (b) completely unknown to us, not even appearing in our star catalogs. The same principle is true, more or less, for any telescope, optical or radio. So, should a signal be detected coming from *any* direction, we have perhaps about a one in 25 thousand chance of saying which star was the source of that signal!

By the way, notwithstanding the comments of Steve Vogt, the discoverer of the exoplanet in question, Gliese 581g is *not* particularly Earthlike. Yes, it happens to be in its star's habitable zone, but there the similarity ends. This planet is tidally locked, with one side always facing its Sun, and the other side always pointed away from it. If Earth were in a similar predicament, we wouldn't even be having this conversation.

To be sure, Gliese 581g is a noteworthy discovery, being in its star's Habitable Zone. Unfortunately, the publicity and speculation surrounding this discovery is a fine example of journalistic exaggeration.

Is The Military Taking Over SETI?

Dear Dr. SETI:

I've been hearing rumors that SETI has been overrun by the United States Navy. Is the military taking over SETI, perhaps trying to cover up some secret detection?

Maurice, University of California (Berkeley)

The Doctor Responds:

First off, Maurice, you need to be aware that SETI is a science, not a single research project (or even a single organization). Various different nonprofit organizations around the world are involved in SETI research, from a variety of facilities and locations, applying numerous different research strategies. As such, it is impossible for any government organization to "overrun" SETI, as it is not at all centralized.

That said, one of the most visible organizations involved in SETI research is the SETI Institute in Mountain View CA. In collaboration with the UC Berkeley radio astronomy lab and several prominent private investors, they have been developing an advanced radio telescope array at Hat Creek in Northern CA. The Allen Telescope Array is being used mostly for SETI research. In addition, to raise funding to support the instrument, SETI Institute and UC Berkeley have received grants to provide telescope observing time to a number of different organizations.

One of these grants is to the US Navy, which pays for the occasional use of the instrument for their own purposes. So yes, to at least that extent, some SETI facilities are being used by the Government for non-SETI purposes (for a price). Whether this constitutes being "overrun" I leave to your own interpretation, but my opinion is that the Navy has no interest whatever in SETI science, and certainly knows no "secrets" in which I would be interested.



In Memoriam:

Dr. Malcolm I. Raff

by H. Paul Shuch, Executive Director Emeritus

When first I encountered Mal Raff, on the air in the mid 1970s, I knew we were destined to become lifelong friends. I knew this not because of our shared passion for amateur radio, nor by his particular callsign, but rather from the curious phonetics he used to articulate it. "W A 2 Uranus, Neptune, Pluto," enunciated the voice through the aether, and I knew at once that my new ham radio acquaintance shared my interest in planetary astronomy. In the months that followed, through sporadic on-the-air contacts, I learned that Mal and I shared interest in aviation and music as well.

None of this is surprising, given Mal's background. An undergraduate physics major at Gettysburg College, an outstanding small liberal arts institution in Pennsylvania, this bright New Jersey native went on to attend graduate school at the University of Illinois, where, circa 1961, he took his first flying lesson. This was about the same time that I, slightly younger, was enjoying my own first flying lesson in Florida. But Mal, being perhaps more motivated, perhaps more resourceful than I, raced through his ratings, picking up private, instrument, commercial, and flight instructor certificates in short order. In time, his academic career transported him to the University of California, Berkeley (I followed his footsteps there some years later). At Berkeley, Mal Raff acquired a Ph.D. in astrophysics, and a fascination with helicopters that culminated in his adding a rotor-wing instructor's rating to his aviation credentials.

It was that helicopter instructor rating that led us ultimately to meet in the flesh, around 1980 at the Reid Hillview Airport in San Jose CA. I based my own Beechcraft at that particular field, and Mal came fling-winging down from Oakland to introduce himself. We became instantly inseparable, talking ham radio and flying in person whenever in close proximity, and on the airwaves when not. When, in 1982, friends and I co-founded the Frazier Lake Airport in Hollister CA, Mal showed up there in a Bell 47, logging the first landing before we had even begun to construct a runway. Though never a member of the Frazier Lake Airpark Association, Mal nevertheless managed to fly in to many an airport barbecue, as my guest, in whatever helicopter or airplane he happened to be flying that year.

Our careers wound in curiously diverging directions. After grad school, Mal started off in academia, giving up a teaching post to work in the aerospace industry. I left my aerospace engineering position to accept a college faculty assignment, then using academia as a springboard to go back to school for my own Ph.D. We quipped about which of us was walking backward through life, but Mal always encouraged my personal and professional growth.

Mal's own professional growth astounded me. He made a dramatic jump from aerospace into biotechnology, developing some of the earliest DNA sequencing techniques, and contributing software to the ultimate classification of the human genome. I asked Mal once how one segued from astrophysics to genetic engineering. "The tools are exactly the same," he re-

plied. "I used to use them to image the very large and distant. Now, I apply them to imaging the very small and near. Same difference." That was the kind of insight that made Mal Raff incredibly interdisciplinary.

Richard Factor (another radio amateur, pilot, and interdisciplinary renaissance man) and I started up The SETI League in 1994. Mal was early to sign on, and

became an active and ardent supporter. Our shared SETI interest had become evident more than a decade prior, when Mal had accepted my invitation to give a colloquium at the college where I then happened to be teaching. His chosen topic: "Speculations about Extra-Terrestrial Visitors." Mal made regular financial contributions to The SETI League (the size of which fluctuated as his personal fortunes waxed and waned), attended several of our SETICon technical symposia, served on our advisory board, chaired our Strategic Planning Committee, and consoled me as the organization's resources shrank almost in inverse proportion to our growing technological acclaim. Mal shared Richard's vision for privatized science; we were just never able to figure out how to make it pay for itself.

Upon his retirement, Mal decided to expand his musical horizons. Always a gifted pianist, he immersed himself in Brazilian jazz. Deciding he wanted to learn to play the vibraphone, Mal tackled that instrument with the same dedication I had seen him bring to his mastery of aviation, and engineering, and biotechnology. He became a regular fixture at (and generous benefactor to) the Berkeley Jazz School. Although the Brazilian jazz combo he cobbled together never gained headliner status, they managed to make beautiful music at a number of Bay Area venues. I would enjoy taking in a performance whenever my travels brought me out West.

When my daughter Erika (who was like a niece to Mal) staged her performance piece "Orbit: Notes from the Edge of Forever" at San Francisco's Intersection for the Arts, Mal and I attended the premiere together. He and I were the only people in the audience to crack up when Erika's co-star uttered the throw-away line she had scripted in his honor: "Oh, be a fine girl, kiss me!" We were probably also the only attendees to recognize a rhythmic pulsing in the musical score as the Morse code characters "CQ."

Mal celebrated his 70th birthday at the Jazz School on April 18th of this year. He was diagnosed with a fast-growing brain tumor on August first, and died at home on November 3rd. I visited with him two weeks prior; we talked for two hours, hugged each other, and said our goodbyes. I feel that I have lost a brother.

Malcolm I. Raff is survived by his wife, Connie Woods, a sister in Washington's Crossing PA, a very old tortoise, and about a dozen rescued birds, including one very intelligent cockatoo. ❖



2010 Billingham Cutting-Edge Lecture

At its 2005 meeting in Fukuoka, Japan, the SETI Permanent Study Group (SPSG) of the International Academy of Astronautics (IAA) voted to establish an annual *Billingham Cutting-Edge Lecture*, as a forum to showcase breakthrough thinking in advancing the Search for Extraterrestrial Intelligence. The lecture honors longtime SPSG member and former chairman Dr. John Billingham, a major force for forty years in promoting innovation within the SETI field. Speakers are to be selected by the SPSG, with one Cutting-Edge Lecture to be delivered each year at the opening of the SETI II sessions of the IAA Symposium on SETI, at the annual International Astronautical Congress.

Each year, the speaker chosen for that year will be asked to present one cutting-edge idea and its potential implications for the scientific search for extraterrestrial intelligence. To help with travel expenses and/or as a small honorarium, the speaker will be paid \$4000 US. Dr. Steven Dick, the first Billingham Cutting-Edge Lecturer, very kindly waived his 2006 honorarium. SPSG member Dr. Allen Tough (Professor Emeritus, University of Toronto; Chief Scientist, Invitation to ETI) has generously pledged \$4000 US a year for the first five years.

The 2010 Billingham Cutting Edge Lecture, "Footprints of Alien Technology," was presented on 29 September 2010, at the 61st International Congress in Prague, Czech Republic, by Prof. Paul Davies. Chairman of the IAA's SETI Post-Detection Taskgroup, the British-born theoretical physicist, cosmologist, astrobiologist and best-selling author is Director of the Beyond Center for Fundamental Concepts in Science and co-Director of the Cosmology Initiative, both at Arizona State University. Previously he held academic appointments at the Universities of Cambridge, London and Newcastle upon Tyne in the UK, before moving to Australia in 1990, initially as Professor of Mathematical Physics at The University of Adelaide. Later he helped found the Australian Centre for Astrobiology in Sydney.

Davies's research interests are focused on the "big questions" of existence, ranging from the origin of the universe to the origin of life, and include the nature of time, the search for life in the universe and foundational questions in quantum mechanics. He helped create the theory of quantum fields in curved spacetime, with which he provided explanations for how black holes can radiate energy, and what caused the ripples in the cosmic afterglow of the big bang. In astrobiology, he was a forerunner of the theory that life on Earth may have come from Mars. He is currently championing the theory that Earth may host a shadow biosphere of alternative life forms.

Paul Davies has won many awards, including the 1995 Templeton Prize for his work on the deeper implications of science, the 2001 Kelvin Medal from the UK Institute of Physics, and the 2002 Michael Faraday Prize from the Royal Society for promoting science to the public. In

April 1999 the asteroid 1992 OG was officially named (6870) Pauldaves. In June 2007 he was named a Member of the Order of Australia in the Queen's birthday honors list.

In addition to his research, Davies is known as a passionate science communicator, and is in demand worldwide for media appearances and public presentations. His 28 popular and specialist books have been translated into over 20 languages, and are notable for presenting complex ideas in accessible terms. His IAC lecture, regrettably scheduled into a room designed to seat forty, drew an audience twice that size, with the overflow crowd backed up into an adjoining hallway.

Among Davies' best sellers are *The Mind of God*, *About Time*, *How to Build a Time Machine*, *The Fifth Miracle* and *The Goldilocks Enigma*. His latest book, *The Eerie Silence*, is about the search for intelligent life in the universe, and will be published in early 2010. Davies devised and presented a highly successful series of 45 minute BBC Radio 3 science documentaries, and a one-hour television documentary about his work in astrobiology, entitled *The Cradle of Life*. In Australia his many television projects included two six-part series *The Big Questions*, filmed in the outback, and *More Big Questions*.



IAC 2010 Photos



In the Opening Ceremonies at the Prague IAC, attendees were treated to traditional Czech folk music and dancing.



International Academy of Astronautics secretary general Jean-Michel Contant (left) and president Madhavan Nair (former head of the Indian Space Research Organisation) convene IAA Academy Day just before the IAC.



SETI colleagues (left to right) Ivan Almar, Stelio Montebugnoli, and H. Paul Shuch at the Prague IAC.



SETI League executive director emeritus H. Paul Shuch marked the 50th Anniversary of the first observational SETI experiment by presenting “SETI: Fifty Years in Fifteen Minutes.”



Co-authors (left to right) Kathryn Denning, Claudio Maccone, H. Paul Shuch, Doug Vakoch, Stelio Montebugnoli, and Seth Shostak met in Prague to finalize their upcoming book, “SETI Past, Present, and Future.”



IAA Academy Day in Prague.



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SearchLites Volume 17 No. 1, Winter 2011
Printed in the USA

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Annual memberships are issued for the calendar year. Those processed in January through April expire on 31 December of that year. Those processed in September through December expire on 31 December of the *following* year. Those members joining in May through August should remit half the annual dues indicated, and will expire on 31 December of the same year.

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