



SearchLites

Vol. 9 No. 3, Summer 2003

The Quarterly Newsletter of The SETI League, Inc.

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Announcing our SETICon Winners

Of course, everyone attending SETICon03 this past April was a winner, with its wide variety of workshops, committee meetings, social gatherings, banquet, guest speakers, Proceedings, and over a dozen top-notch technical papers presented. And, as in previous years, our generous door-prize donors ensured that nobody present at our annual Awards Banquet went home empty-handed. But we are pleased to announce here the recipients of The SETI League's two highest honors, as well as the lucky winners of our top banquet prizes.

At its annual Awards Banquet, held the evening of 26 April 2003 at The College of New Jersey, the nonprofit SETI League, leaders in a global search for extra-terrestrial intelligence, recognized two SETI pioneers and a respected social scientist for major contributions to the art and science of SETI.

The Giordano Bruno Memorial Award, which honors the memory of the Italian monk burned at the stake in 1600 for postulating the multiplicity of inhabited worlds., is presented annually to a person or persons making significant technical contributions to the art, science, or practice of amateur SETI. The first Bruno was presented in 1996. This year, the names of Philip and Phylis Morrison are proudly added to our illustrious list of Bruno recipients.

The Morrisons are best known to the general public for their many books, articles, and public television programs on a variety of science topics. Though never burned at the stake, Philip Morrison co-authored in 1959 the controversial article which first proposed the techniques now routinely used by radio astronomers to seek out other civilizations in the cosmos. The Morrisons, both longtime SETI League members, encouraged active participation in SETI science by amateur and professional observers alike. In fact Philip Morrison, who started his quest as a young radio amateur in the 1930s, has provided guidance and inspiration to those radio hams who founded, and comprise much of the membership of, the grass-roots SETI League. Phylis Morrison, who passed away last year, is honored in memoriam.

The more recently established Orville N. Greene Service Award honors the memory of SETI League supporter and co-founder Orville N. Greene, and is presented annually to a person or persons making unusual volunteer contributions, or providing extraordinary service, to The SETI League, Inc. We are pleased that the second annual Greene Award went to University of Toronto futurist Prof. Allen Tough, one of The SETI League's earliest and most active members.

Tough has long been involved in the speculative side of SETI science, through his teaching, writing, and participation on SETI committees within the International Academy of Astronautics and the International Astronomical Federation. He has served The SETI League in a number of volunteer roles, including Regional Coordinator and founding Chairman of the organization's Strategic Planning Committee. He is the author of an Internet-based [Invitation to ETI](#), to which over 80 scientists, educators, authors, artists, and futurists are now signatory.

In the doorprize department, our First Prize, the demonstration Low Noise Preamplifier built by member Ed Cole, AL7EB, during our Microwave Hardware Workshop, ended up in the hands of Argonaut and committee chairman David Ocame, N1YVV. David Clingerman, W6OAL, of Olde Antenna Lab most graciously provided us with an L-band helical antenna feed to present as our Grand Prize. This year's lucky Grand Prize winner is Dr. Bruce Cornet of New Jersey USA. Other generous door prize donors include ARRL (books and subscriptions), Amsat (membership), SETI Institute (books and t-shirts), Jeff Lichtman of Radio Astronomy Supplies (CD-ROMs), Steve Kostro from Down East Microwave (signal source kit), Joe Lynch of CQ-VHF Magazine (subscriptions), Michael Crick of Ham University (software), Daniel Boyd Fox (software), Neil Boucher of SETI Star (software), Al Ward of Agilent (transistors), H. Paul Shuch (tools), and Cliff Pickover, Al Harrison, David Darling, and Edward Ashpole (books). We thank our prize donors, and encourage our members to frequent their places of business.

Perhaps you will be listed here next year, as a winner or donor. Mark your calendar now for the joint SETICon04 and International Amateur Radio Moonbounce Conference, to be held from 6 to 8 August 2004, once again at the College of New Jersey near Trenton NJ. ❖

It's True, Men Really Are from Mars

And so are women, thanks to an invasion by Red Planet microbes

by Paul Davies (astrobiology@els.mq.edu.au)
from The Guardian, 30 Oct. 2002, used by permission

A hundred years ago it was widely believed that there was life on Mars. The American astronomer Percival Lowell even produced detailed maps of canals he claimed had been constructed by water-deprived Martians. Then in the 1960s space probes sent to Mars failed to reveal any sign of life, let alone intelligent canal-building life. But the coup de grace came in 1977 when the US space agency NASA landed two Viking spacecraft on the Martian surface with the specific aim of searching for signs of biological activity. Not so much as a bacterium was found. The surface of Mars appeared to be a freeze-dried desert, utterly hostile to any form of life.

Today this pessimistic assessment seems too hasty. I believe not only that Mars has harboured life, but it may actually be the cradle of life. This conclusion arises because of the recent discovery that our biosphere extends deep into the bowels of the Earth. Microbes have been found thriving at depths of several kilometres, inhabiting the pore spaces of apparently solid rock. Genetic studies suggest these deep-living organisms are among the most ancient on the planet. They are, in effect, living fossils.

Because temperature sharply rises with depth, the subterranean microbes tend to be extremely heat-tolerant. There is, however, a limit. Estimates suggest that 150C is probably an upper bound for life as we know it. After Earth formed about 4.5bn years ago it remained very hot, both from enhanced radioactivity and the violence of the planet's birth. Temperatures below ground would have been lethal, even for heat-loving microbes. On the other hand the surface was pretty uncongenial too. Astronomers think that for about 700m years a barrage of giant asteroids pounded the planet. The big impacts would have swathed the globe with incandescent rock vapour, boiling the oceans and sterilising the rock beneath.

By contrast, Mars cooled quicker because it is smaller. The comfort zone for deep-living, heat-tolerant microbes would have been deeper sooner. All in all, the Red Planet offered a more favourable habitat for life during the early history of the solar system. We don't know where life began, but a kilometre or two below the surface of Mars seems a good place. How, then, did life get from Mars to Earth? The answer is straightforward. The same asteroid impacts that made early life so hazardous

also served to splatter vast quantities of Martian rock around the solar system. A fraction of this hits Earth; indeed, it does so today. So far, a couple of dozen meteorites have been found that can be traced back to Mars.

If there was life on Mars, then it is possible that some Martian microbes will have hitched a ride inside the ejected rocks and made their way to Earth. When I suggested this idea about 10 years ago, few scientists took it seriously. They found it incredible that any form of life could survive being blasted off a planet and subjected to the inhospitable environment of outer space. Yet evidence is steadily growing that microbes could withstand the violence of ejection, the savage radiation of interplanetary space, as well as the heat of atmospheric re-entry. Studies of the Martian meteorites show they were not highly shock-heated when propelled into space. As for the microbes, cocooned inside rocks a metre or more across, they would be shielded from the worst effects of radiation.

Initially Mars was the more bio-friendly planet; Earth was a scalding hell. Once life got going on the Red Planet, it quickly spread through the subsurface zone - a good refuge from impacts. However, those microbes living near ground zero of a major impact would have been flung into orbit round the sun. The lucky ones, buried deep inside large boulders, could have survived in space for millions of years. A few of those boulders would, over such durations, hit the Earth. Although many microbes would perish in space, and more would die on high-speed entry to Earth's atmosphere, it would take just one viable organism to seed our planet with life.

One of the puzzles about life's appearance on Earth is that it happened so quickly after the bombardment abated about 3.8bn years ago. There are distinct traces of life in Australia dating from 3.5bn years ago, and hints of life in rocks from even earlier times. This is readily explained if life came from Mars. We can imagine a continuing rain of microbe-laden Martian debris falling on Earth during the bombardment. As soon as conditions finally settled down, these colonists would have flourished. Martian life probably established itself here many times, only to be destroyed by the next big impact. If I am right, then you and I are the direct descendants of the first Martians able to burrow hot and deep, and ride out the remaining fury of the cosmic bombardment.

Paul Davies is a member of the Australian Centre for Astrobiology in Sydney and a visiting professor at Imperial College. His book The Fifth Miracle: the Search for the Origin of Life is published by Penguin. ❖

Extraterrestrial DX Circa 1924: "Will We Talk to Mars in August?"

Copyright © 2000 by Thomas H. White

When someone on Earth hears a radio station, it is safe to assume the signals originated on Earth. However, in the summer of 1924 there wasn't the same certainty. In August some were carefully making last minute adjustments to their radio sets, hoping to hear signals from Mars. Some, thanks to stations like WHAS, would temporarily claim success.

Today, because of the various landings on Mars, the red planet is seen as a vast and probably lifeless desert. But in 1924 there was reason to believe that extensive vegetation, and perhaps even advanced life, existed on the red planet. Some even believed that Martian inhabitants would be far superior to human beings. Astronomer Percival Lowell had been the United States' foremost proponent of the existence of an advanced Martian civilization. In a series of writings Lowell claimed his telescopic observations had revealed, on especially clear nights, an intricate network of lines on the Martian surface. He hypothesized that these lines were a complex canal system, used to irrigate the dying planet with water drawn from the polar ice caps. Most other observers saw only vague shadings on a smudgy sphere, distorted by the Earth's atmospheric turbulence. But if Lowell's observations were correct, then an advanced civilization must have existed on Mars, and might still exist. Communication with these beings promised great scientific revelations.

Over the years there had been various proposals for contacting Mars. Flashing a series of bright lights towards the planet had been suggested by the electrical experimenter Nikola Tesla, but never attempted. A New York Times editorial endorsed the suggestion that a proof of the Pythagorean theorem be carved on a vast scale on the Siberian steppes. Not only would this be big enough for easy viewing, but the canal-digging Martians would be favorably impressed with our own engineering and mathematical skills. A little known Clark University professor by the name of R. H. Goddard was experimenting with rocketry, which he claimed would one day link the planets, but his work was still barely getting off the ground.

Thanks to the march of science, Earth now had a powerful new communication tool -- radio. During the previous four years millions had witnessed, in their own living rooms, the miracle of capturing voices from half a continent away. The previous November some had received transatlantic signals exchanged during the International Radio Week tests. Would not a Martian civilization, builders of a canal system far beyond the capabilities of humans, be thoroughly versed in the advanced use of radio? On earlier close passes, perhaps over many thousands of years, Mars might have fruitlessly attempted to hail its backward neighbor. Earthlings now had the technology required to receive signals across vast expanses of space. On August 23rd Mars and Earth would come to within 55.7 million kilometers of each other, their closest approach since 1804. Perhaps for the first time the Martians would find us listening.

In spite of skepticism (the Marconi organization called it a "fantastic absurdity"), plans were organized on various fronts. Apparently no attempt was made to transmit signals to Mars. Transmitter powers were too limited, and it was known that the newly discovered Heaviside Layer (ionosphere) would absorb and scatter any signals sent from Earth on the frequencies then in use. (Although no doubt some announcers couldn't resist the temptation to say hello "to our Martian listeners".) It was hoped that more powerful Martian transmissions would be able to bridge the gap. Thus, the task on Earth would be to intercept these transmissions. And every home with a radio was a potential detector.

Professor David Todd, former head of the Amherst College astronomy department, worked to organize radio silent periods, to aid the reception of any interplanetary signals. Major General Charles Saltzman responded by ordering all American military stations to monitor and report any unusual signals, but he didn't order any cutback in normal transmissions. Admiral Edward W. Eberlen, Chief of Naval Operations, did the same for his branch of the military. Professor Todd had requested that every radio station maintain a five minute silence each hour over a two day period. Only WRC in Washington, DC appears to have complied with this request, although officials in other nations were reported "interested".

Interpretation of the signals also merited attention. A Martian broadcast might be in the form of a speech delivered in an alien tongue, or Earth might be serenaded by a lilting Martian tune. But most expected any transmissions to use a code based on some mathematical key. William F. Friedman, Chief of the Code Section in the Office of the Chief Signal Officer of the Army, announced he was available to interpret any other-worldly codes. Friedman had already gained recognition by deciphering a series of messages between two defendants in the Teapot Dome scandal.

Monitoring centered on Saturday night, when the two planets were at their closest. However, strange signals were reported even before the nearest approach of the planet. Radio operators in Vancouver reported on Thursday that they were receiving a series of "four groups of dashes in groups of four". Both the form and origin of the strange signals were unidentified, and a close watch was promised. In London a specially constructed 24-tube set picked up "harsh notes" of an unknown origin. WOR engineers in Newark, New Jersey reported similar sounds at nearly the same wavelength. A Bostonian reported a strange ringing, ending with an abrupt "zzip".

Into the midst of all this activity marched WHAS in Louisville, Kentucky. By coincidence, military maneuvers near Louisville were scheduled on Friday, the day before Mars' closest approach. (Mars was, after all, the god of war). WHAS saw the maneuvers as an opportunity to score a first, and scheduled a special half hour program, where for the first time a "war" correspondent would broadcast live the progress of the mock battle. Credo Fitch Harris, then manager of WHAS, reported on the events in his book "Microphone Memoirs". WHAS's innovative program featured a remote broadcast carried by telephone lines direct from the "front". A Colonel

Hamer provided commentary. By chance he was located between two three-inch field artillery pieces firing in an alternating sequence at four times per minute. Scattered small arms fire could be heard at the same time. Because the colonel's remarks ended a few minutes earlier than expected, the close of the program consisted solely of the sounds of the firing of the artillery and small arms, unbroken by any announcements.

According to Mr. Harris, this final segment was thought by some listeners to have originated from Mars. Imagine the reaction of an unsuspecting person, searching for evidence of Mars, coming across this odd program. (Most schedules listed WHAS as carrying orchestra music at this time.) Every fifteen seconds a loud "bong" was heard, as the loud artillery reports overwhelmed the microphone. In between the small arms firing sounded like a strange code, clearly not Morse. Could it be Mars? Could it be anything but Mars?

Eventually the various mysterious reports were sorted out. The operators of the 24-tube set decided they had heard nothing more exotic than "a combination of atmospheric and heterodyning". (RCA engineers calculated that, for the signals to have originated from Mars, a one million megawatt transmitter, consuming the equivalent of 2.7 million metric tons of coal hourly was required. The engineers suggested that the Martians had better outlets for their talents and resources). The Vancouver signals were identified as a new type of beacon being developed to aid navigation in Washington state inland waterways. And although WHAS eventually took great pride in its contribution to the confusion, as Credo Harris' book greatly overstates the number of reports that could be traced to WHAS, everyone eventually figured out the true nature of the mock battle broadcasts.

The final consensus was that there was no evidence the red planet had shown any interest in talking to us, although, as noted by the New York Times, "...men would never cease trying to establish communication with Mars". Camille Flammarion, 82 year old French astronomer, was confident not only that the Martians were far superior to Earthlings, but that they ultimately would contact us through the means of mental telepathy. (Fourteen years later Orson Welles' famous "War of the Worlds" broadcast would convince many that the Martians were indeed making an unexpected direct, and very unwelcome, contact.)

Perhaps it's best that Mars turned out not to have any radio stations. It's difficult enough having to regulate radio on an earthly scale. Having to include other planets in regulatory agreements would just make things even more complicated.

By the way, I just noticed something. *No one ever explained where the Boston "zzip" signals came from...*

Editor's Note: Mr. White maintains an excellent collection of articles on his [United States Early Radio History](http://www.ipass.net/~whitetho) website, at <http://www.ipass.net/~whitetho>. ❖

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.

May 3 - 4, 2003: *Trenton Computer Festival*, Edison NJ.

May 16 - 18, 2003: *Dayton Hamvention*, Dayton OH.

May 23 - 26, 2003: *Balticon 37*, Baltimore MD.

June 20 - 22, 2003: *ARRL National Convention and HamCom 2003*, Arlington TX.

July 24 - 27, 2003: *Central States VHF Conference*, Tulsa OK.

July 27 - 30, 2003: *SARA Conference*, NRAO Green Bank WV.

August 22 - 24, 2003: *29th Eastern VHF/UHF Conference*, Enfield CT.

August 28 - September 1, 2003: *Torcon 3 World Science Fiction Convention*, Toronto ON Canada.

August 30 - 31, 2003: *UKW-Tagung 48th VHF Convention*, Weinheim Germany.

September 5 - 7, 2003: *Third European Radio Astronomy Congress*, Heppenheim Germany.

September 25 - 28, 2003: *Microwave Update*, Seattle WA.

September 29 - October 3, 2003: *54th International Astronautical Congress*, Bremen, Germany.

October 11 - 12, 2003: *Mid-Atlantic VHF Conference and 32nd Annual Pack Rat Flea Market*, Trevoze PA.

October 17 - 19, 2003: *AMSAT Space Symposium*, Toronto Canada.

October 18 - 19, 2003: *ARRL EME Contest*, first weekend. Listen for the W2ETI Moonbounce Beacon on 1296.000 MHz.

November 15 - 16, 2003: *ARRL EME Contest*, second weekend. Listen for the W2ETI Moonbounce Beacon on 1296.000 MHz.

December 12 - 14, 2003: *Philcon '03*, Philadelphia PA.

February 6 - 8, 2004: *Tropical Hamboree*, Miami FL.

February 13 - 15, 2004: *HamCation 2003*, Orlando FL.

March 12 - 14, 2004: *Contact 2004 - Mars, Myth and Reality*, Mt. View CA.

April 17, 2004: *Sixth Annual SETI League Ham Radio QSO Party*; 14.204, 21.306, and 28.408 MHz.

August 6 - 8, 2004: *SETICon 04 SETI League Technical Symposium and Annual Membership Meeting*, in conjunction with the *11th International Ham Radio Moonbounce Conference*, The College of New Jersey, Ewing (Trenton area) NJ.

September 2 - 6, 2004: *Noreascon Four World Science Fiction Convention*, Boston MA.

October 4 - 8, 2004: *55th International Astronautical Congress*, Vancouver BC Canada.

August 4 - 8, 2005: *Interaction World Science Fiction Convention*, Glasgow, Scotland UK.

October 17 - 21, 2005: *56th International Astronautical Congress*, Fukuoka Japan. ❖

An Interview with Dr. SETI ®

conducted by Nilanjana Sarker (nilanjana_s@hotmail.com)
Department of English, Edinboro University of Pennsylvania

Ms. Nilanjana Sarker: The government is spending billions of dollars on making nuclear weapons which could wipe out the whole human race at once. On the other hand NASA stopped the funding of SETI. Do you think this was a right thing to do?

Dr. H. Paul Shuch: That's rather a loaded question, framed to elicit an emotional, rather than a rational, response. Nevertheless, I will endeavor to answer it rationally.

By "the government" I presume you mean the US government. I was not aware that, with the cold war having ended, they were still spending "billions of dollars on making nuclear weapons." It may be true, but I'd want to check the facts before accepting that statement at face value.

I don't think SETI funding should have been cancelled. On the other hand, I don't think science funding should be predicated on whether or not we engage in weapons programs. If it were my choice of budget items, I would favor science over weapons of mass destruction, to some extent. But I am not Congress, just one voter out of a hundred million.

The fact is, Congress had the power to cancel NASA SETI, and they exercised it. There's nothing we can do about that, unless we choose to become political lobbyists (we're not; we're scientists). What we *can* do is make sure that SETI survives, despite the lack of Government funding. And we've modestly successful in that pursuit.

Ms. Sarker: How is the professional search done by SETI League different from the amateur searches done worldwide?

Dr. Shuch: First off, The SETI League does *not* do the "professional search" -- that's done by our colleagues at the SETI Institute in California, and other groups. We (The SETI League) are the ones coordinating the amateur efforts. Next, the amateur searches are just as you state -- worldwide. No other SETI observing project has ever boasted our more than a thousand participants in 63 countries, or over a hundred radio telescopes on five continents. It is the global nature of our search that makes The SETI League unique among scientific organizations.

Ms. Sarker: Why is SETI League in the grassroots scale?

Dr. Shuch: As a grassroots organization, we can tap an incredible resource, one which has never before been properly exploited: the world's radio amateurs. This is an amazing pool of talent, ideally suited to the SETI task.

Ms. Sarker: What kind of prospect does SETI League have?

Dr. Shuch: Do you mean specifically our prospect for detecting extraterrestrial intelligence? About as good as any other SETI organization has. If there is no technological ETI living

within our timeframe, then none of the searches is going to detect it. If it exists, and generates the kinds of signals all SETI searches are concentrating on, then we have about as good a chance of detecting them as anybody.

Ms. Sarker: Is SETI League getting private fundings at present?

Dr. Shuch: Yes, but far too little, in these difficult economic times. During the past year, we have seen our private donations drop an alarming ninety percent!

Ms. Sarker: What do you think are the chances of finding intelligent lifeforms who would be capable of communicating with us?

Dr. Shuch: Pretty good, actually, if life is as common in the universe as we suppose it to be. There is an evolutionary imperative for communicating, and that suggests that any civilization, given adequate time and resources, will eventually develop the kind of technology which makes communication possible.

Ms. Sarker: How do you plan to decipher the signals if you find any?

Dr. Shuch: We don't. SETI is about existence proof, not content of communications. We are looking for clear, unambiguous evidence that other intelligent beings exist. To determine that, we need not decipher signals, merely determine that they are indeed of intelligent extraterrestrial origin. A SETI message, to be successful, need contain only one bit of data: "here I am!"

Ms. Sarker: Different people have estimated different numbers at different times. In your view how many intelligent lifeforms may exist in our galaxy?

Dr. Shuch: The key word here is "may". We can make good scientific (not to mention philosophical) arguments for life abundant, but unless they come here to shake our hands, the only way we'll ever really know is to do the experiment. SETI has the power to answer one of the most fundamental of human questions, definitively and unambiguously.

It is my opinion that a huge number (perhaps in the millions) of intelligent, technological civilizations *have* existed in the fifteen thousand million years or so since the Big Bang. The key question is, how many of them exist *now* (or close enough to *now* to be of interest to us, at this brief moment in human history)?

Ms. Sarker: Do you want to commit to a number?

Dr. Shuch: No.

Ms. Sarker: Then would you side with a higher number or a lower number?

Dr. Shuch: I opt for the higher estimates. Ward and Brownlee (in their book Rare Earth) argue for humanity's uniqueness in

the cosmos. They base their argument on the improbability of the long chain of random events that led to our existence. Well, they're right that the chance of another "us" evolving exactly like we did is just about zero. Where their reasoning is flawed, in my opinion, is that we need not find another "us" to find an interesting communications partner. Beings who have evolved in the light of distant suns, who have nothing physical in common with us, can still easily be intelligent, and may have mastered electromagnetic communication technologies.

Ms. Sarker: If we find intelligent lifeforms somewhere else in the Universe, do you think they will be carbon based lifeforms?

Dr. Shuch: Maybe not carbon based, but certainly water based. Life, based on anything, is not going to exist absent a solvent. The ideal solvent on which life can be built will be polar, and have a high surface tension, and have a wide freezing point to boiling point spread, and have a higher density in the liquid state than in the solid. Water is the only solvent I know which fits all four of these conditions. It is as though water were deliberately designed with life in mind! So, we search for water-based life primarily, whether it practices hydrocarbon chemistry or not.

Ms. Sarker: Do you think they will have DNA backbones?

Dr. Shuch: Unless life is immortal, it needs to reproduce. To reproduce, it needs to pass along genetic information. DNA is one mechanism for doing so. But it probably isn't the only one. If exolife evolved independently of life on earth, it probably is not DNA based. If, on the other hand, Hoyle's and Wickramasinghe's theories of panspermia are correct, then life on earth was seeded from beyond. In which case, we, and they, and all life in the universe, may well be related. That would suggest that DNA (and, in fact, hydrocarbon chemistry) might be somehow universal.

Ms. Sarker: According to the recent findings, do you think there is any bacterial niche in Mars?

Dr. Shuch: I've believed so since before the recent findings. For me, ALH-84001 merely reinforces that belief.

Ms. Sarker: Do you think within the next 20 years we would find ET (not necessarily intelligent) under Europa or subterranean Mars?

Dr. Shuch: Probably not within the next 20 years; it takes too long to plan, fund and launch interplanetary missions. Most assuredly within the next 40 years

Ms. Sarker: Where are they?

Dr. Shuch: Thank you, Enrico Fermi! (If you don't know about the Fermi Paradox, look it up.)

Ms. Sarker: If intelligent lifeforms do communicate with us, do you think they would be biological lifeforms or artificial lifeforms? Is there a possibility that artificial lifeforms may

take over biological lifeforms, and the signals that we get are generated solely by the artificial lifeforms and have nothing to do with their biological ancestors?

Dr. Shuch: I consider artificial lifeforms to be the next step in human evolution. Our technological creatures may well be our descendants. Given that we're going in that direction, it wouldn't surprise me at all if other civilizations are composed of the technological descendants of organic beings.

Ms. Sarker: Do you think there is any danger if the intelligent lifeforms elsewhere in the galaxy know of our presence?

Dr. Shuch: There is danger if they know about us. There is danger if they don't know about us. The Universe is a dangerous place. Of course, that's no reason to hide under a rock (or to remain on our own rock). It is human (and, I presume, alien) nature to confront danger head-on, in the pursuit of knowledge.

Ms. Sarker: In the next 5 years where do you think SETI League will go?

Dr. Shuch: We are at a fiscal crossroads; without a respectable infusion of funds, the privatized SETI organizations (including The SETI League) will probably not survive another five years. I optimistically believe that five years is long enough for the economy to recover, for the political winds to shift, and for our society to recognize the value of continued SETI research. If I am wrong in this, SETI will in about five years recede into the footnotes of history.

Ms. Sarker: Would we even know if the signals we are receiving are artificially generated? They may even be hidden in the background of natural sounds.

Dr. Shuch: Oh, absolutely! SETI seeks the hallmark of artificiality: signals that cannot be produced by nature, through any mechanism which we know or can imagine. We know a great deal already about the natural electromagnetic environment, and are learning more every day. Separating the natural from the artificial requires tremendous computational power, but that's only getting better. Since raw computer power seems to double every year, if we don't have the means to recognize an artificial signal today, surely we will tomorrow.

Ms. Sarker: Besides radio or optical search is SETI League thinking of doing any other kinds of search?

Dr. Shuch: The entire electromagnetic spectrum is likely turf for communications. Today, we search the microwave and optical segments. As our technology improves, we will expand the search to include the far and near infra-red, ultra-violet, X-ray, gamma ray, and cosmic ray spectra. Moving in the opposite direction, once we learn how to detect and process gravity waves, we'll be wanting to search that spectrum as well. There are no wrong frequencies for SETI, merely frequencies that we don't yet know how to monitor.



Editorial:

Blame It On Rio

by Dr. H. Paul Shuch, Executive Director

"I think I'm seeing something," the intrepid Argonaut stated to the closed signal verification email list, and then proceeded to post a string of numbers representing date, time, right ascension, declination, frequency, and amplitude. "Anybody care to confirm?"

For a day and a half, the emails flew freely, with half a dozen amateur radio telescopes trained on the same slice of sky, seeking a consensus. Ultimately, I was asked to proffer an opinion. "On a scale of zero to ten," I confidently proclaimed, "we can give this one a three."

An arbitrary attempt at quantification? Hardly! I was rating a detection on the Rio Scale, SETI's newest metric for assessing the importance of any claimed detection. And it's my hope we will join our professional colleagues around the world in making the Rio Scale our measurement standard.

The Rio Scale is an ordinal scale between zero and ten, used to quantify the impact of any public announcement regarding evidence of extraterrestrial intelligence. The concept was first proposed in Rio de Janeiro, Brazil (hence its name) by Ivan Almár and Jill Tarter in a paper presented to a major SETI meeting in October, 2000. Under their leadership, members of the International Academy of Astronautics worked for two years to refine and perfect the Rio Scale, in order to bring some objectivity to the otherwise subjective interpretation of any claimed ETI detection.

The Rio Scale was officially adopted by the international SETI community at the October 2002 World Space Congress in Houston. Within a month, The SETI League was applying it to amateur observations. If it catches on as well as the Richter Scale has for earthquake severity, then the public will have little doubt as to the importance of future SETI detections.

Anyone can do a Rio Scale analysis of any SETI signal detection, be it current, historical, or hypothetical. One need merely answer four questions about the class of the reported phenomenon, the type of discovery, the estimated distance to the source of the phenomenon detected, and the credibility of the person or organization reporting the data. Crunching the resulting numbers yields a single integer, zero to ten, which we can then report to each other and to the press.

If you have access to the Internet with a JavaScript-enabled browser, you are invited to try your hand at an interactive Rio Scale Calculator. Browse to <<http://iaaseti.org>> and follow the Rio Scale links. Radio buttons enable you to quickly enter the particulars of the detection being analyzed. The calculator software computes the resulting Rio Scale value for the event under study. Members of the scientific community and the press can use this tool for estimating Rio values during analysis of SETI candidate events, and are encouraged to assign Rio Scale values in quantifying their estimates of the importance of any reported detection. The Rio Scale is a tool for dynamic, rather than static, analysis. Throughout the life of any candidate SETI event, as research is conducted and verification measures pursued, new information is constantly being made available which will

impact our perceptions as to the significance and credibility of the claimed detection. Thus, the Rio Scale value assigned to any SETI detection can be expected to change significantly (either upward or downward) over time. In the case of the Project Argus detection cited above, during the course of a week's observations, the assigned value slid from three down to zero, when the source of the signal was finally traced to terrestrial interference.

This one wasn't ET calling home. But it might have been. When The Call is finally intercepted, and we assign it a high Rio Scale value, I'm willing to bet the detection will have been made by a SETI League member. ❖

SETI Bookshelf

**Recommended reading, compiled by Prof. Allen Tough
for Contact In Context <<http://cic.setileague.org>>**

Astrobiology. This new quarterly describes itself as "a forum for scientists seeking to advance our knowledge of life's origin, evolution, distribution, and destiny in the universe." It is edited by Dr. Sherry Cady and published by Mary Ann Liebert Inc.

Ragbir Bhathal (Guest Editor), **SETI — 6: The search for extraterrestrial intelligence.** Special issue of Acta Astronautica, 46 (10-12), May-June 2000. Selected papers from the International Academy of Astronautics SETI sessions in 1996 through 1998.

Eric Chaisson, **Cosmic evolution: The rise of complexity in nature.** 2001. "Recent advances throughout the sciences suggest that all organized systems share generic phenomena characterizing their emergence, development, and evolution. Whether they are physical, biological, or cultural systems, certain similarities and homologies pervade evolving entities throughout an amazingly diverse Universe."

David Darling, **Life everywhere: The maverick science of astrobiology.** 2001. "This book is a report from the front-line of astrobiological research, an examination of issues, arguments and experimental results foremost in the minds of those who are spearheading this astonishing new field. Beyond that, it is an attempt to see the way ahead, to identify the concepts that may eventually unify our understanding of life in a broader context. On what may be the brink of our first encounter with an alien species, we ask: What principles govern the emergence and evolution of life throughout the cosmos? Where can we expect to find other living worlds, and what will we discover on them?"

Steven J. Dick, **The biological universe: The twentieth-century extraterrestrial life debate and the limits of science.** 1996. This insightful intellectual history shows how separate scientific disciplines eventually converged to form the new fields of SETI and astrobiology. The book spells out the biological universe as a new cosmological worldview. Steven Dick's keynote address at the 2002 SETI League Technical Symposium noted that "we may in fact live in a post biological universe, one that has moved beyond flesh and blood intelligence to artificial intelligence (AI), a product of cultural rather than biological evolution."

To be continued in the next issue of *SearchLites*. ❖



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