



SearchLites

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The Quarterly Newsletter of The SETI League, Inc.

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This I Believe

by H. Paul Shuch, Executive Director

"So, Doc, do you believe in extraterrestrials?" I hear this question frequently, from family and friends, students and strangers alike. It's a question to which I've become accustomed, having invested a significant life-fraction in pursuing SETI, the scientific Search for Extra-Terrestrial Intelligence. My usual answer is that the search isn't so much about what I believe as it is about finding truth. Scientists must always separate faith from fact. But that answer, I realize, is a cop-out.

Thanks to recent astronomical discoveries, we now know for certain that we live in a universe capable of supporting life. The skies are filled with stars abundant, around a sizeable fraction of which we have now detected unseen companions. Among the multitudes of observed planets are a fair number with conditions capable of supporting life. Intelligence confers survival value, as does the ability to communicate, so it's not a big stretch to envision hundreds of communicative civilizations calling to us across the cosmic void. Recent advances have brought us to the brink of contact, and yes, I do believe we have the capacity to cross that brink. But do we have the will?

SETI is a multigenerational enterprise. After a half-century of dedicated research, we are no closer to the proof we seek than we were at the outset. I believe that the journey upon which I have embarked will be completed by my distant descendants. That thought is humbling, but also motivating.

For perhaps the first time in human history, we live in a universe in which the notion of extra-terrestrial life has become a testable hypothesis. Today as never before, we possess the tools, the technology, the tenacity to embark upon a journey to answer that fundamental question which has haunted humankind since first we realized that the points of light in the night are other suns: *are we alone?*

"So, Doc," asked a shock jock on morning radio not long ago, "do you believe in extra testicles?"

"No," I answered with equal flippancy, "I believe two should be enough for any man. Now, let's talk about SETI."

SETI involves searching the unknown, seeking the familiar. If we do the search, and we do it right, some generations from now our offspring will have arrived at one of two possible outcomes. Either they will have detected incontrovertible evidence of our cosmic companions, or not. If the former, the implications for human life are self-evident. But what if the other? What if, after centuries of searching, we come up dry? Might this lead, in the long term, to a widespread belief in the sanctity of life, and the precious place our home world holds in the heavens? Perhaps a lack of SETI success will return us to a pre-Copernican perspective. Maybe it will encourage us to treat our planet with renewed reverence.

The Search will, in time, show us either that we are not alone, or that we are. Either outcome, I believe, will change forever humanity's place in the cosmos.

Editor's Note: This I Believe is a national media project in the US that invites Americans from all walks of life to write about and discuss, in just 500 words, the core beliefs that guide their daily lives. They share these statements in weekly broadcasts on National Public Radio. This essay is our Executive Director's contribution to that project.

Guest Editorial:

The Great Silence – A Universe of Wimps?

by **Richard Factor, President, The SETI League, Inc.**

David Brin is a smart guy. And if his guest editorial in the last *SearchLites* is any indication, he is worried about "active SETI." While an enthusiastic supporter of passive SETI, he has initiated (or at least tried to initiate) a dialog with the increasing number of commercial ventures that will, for a price or for entertainment, "beam your message into space." I'm reluctant to put words into the mouth of one of the outstanding writers of our time, but I think it's fair to summarize his thinking thus:

- We don't know who or what is out there.
- Shouldn't we think first, transmit later, if in fact we should transmit at all?

After all, the "Great Silence" (total absence thus far of detected ETI) may have Causes beyond accident, coincidence, or lack of sufficient searching. And we may not want to attract those Causes to our corner of the galaxy.

The counter argument (if one can argue against serious consideration before irrevocably committing potentially disastrous folly) is along the lines of "freedom of speech" and "it can't be stopped anyway, so why try." As with most arguments, there is merit on both sides. (Brin has called for a dialog, not a prohibition.)

Since the oft-cited "I Love Lucy" transmissions at the beginning of television, Earth has had an electromagnetic footprint, one that is expanding through the galaxy, and losing intensity as it does so. At some distance, perhaps less than the ~60 light-year sphere, it has already reached, it will no longer be practically detectable. At some greater distance it will no longer be even theoretically detectable, at least not without receiving systems measured in light years, or "magic" technology. Since these and subsequent transmissions can't be recalled, the real question with regard to "active SETI" is whether it's wise to do anything that will make us significantly more detectable than we already are. Are we with Brin? Do we feel making the Earth stand out - even "gaudy" as he puts it referring to the hypothetical ET beacons that we have failed thus far to find - is unwise, perhaps terminally so? Or is he being a nervous Nelly?

See above. David Brin is a smart guy. That's not the beginning of a "But..." clause. He may be right. He certainly makes some good arguments.. His issue is a valid one propounded by a person who is not unreasonably concerned for our continued existence.

There is a third side to this discussion, however. It may be that, instead of the Great Silence being caused by inimical intelligence of whatever form, it may be caused by Brin's argument! As we as a civilization get smarter, more secure in our own existence, and happier with our toys and culture, will we progressively share his concern? Already we develop more lawyers and diplomats than explorers and pioneers. (This sounds like sarcasm, but it's happening and spreading as the world develops.)

If you believe the "principle of mediocrity" - the largely accepted theory that neither Earth nor Earthlings inhabit a special or privileged place in the universe - you have to think that any technological race will go through a similar process as it discovers how dangerous the physical universe already is, even without the presence of menacing space aliens. If Brin's argument gains adherents, the tendency toward caution will overwhelm the cowboy culture we have now where even individuals can send messages into space. As our technology makes it easier to beam messages, our culture transmogrifies from cowboy to wimp; by the time an individual or tiny group commands the power and hardware to send a serious active SETI message, laws, custom, and police powers prevent it.

In the Drake Equation, L is the factor that expresses the lifetime of a communicating civilization. This is one of the greater Drake imponderables, since we have only ourselves as an example, and we don't even know the answer for us. Not only have we been "able" to communicate for only the past few decades, we have not even had the notion of communicating for longer than that. One potential limitation to the value of "L" has been "civilizations destroy themselves." While this remains a possibility, it doesn't seem inevitable. However, announcing ourselves via electromagnetic radiation is strictly optional. Our communication technology is such that high-power, readily detectable transmissions are voluntary. Even if you say "don't we need high power radar to protect earth from asteroid collisions" and similar projects, I would respond that, given the necessity to transmit high power, the signals could easily simulate noise and hence be undetectable at any meaningful distance. Despite the possibility that our civilization will remain extant, we could easily decide that we don't want it to be detected, or at least not detected as one that is "intelligent." (Our atmospheric composition, detectable from interstellar distances, gives sufficient clues that we have a "biosphere.")

If Brin's suggestion has merit, making ourselves easily detectable should be avoided. Given the principle of mediocrity, and that we and our presumed aliens live in the same universe, with the same physical laws, would they not have their Brin's (let's call them "Nirbs - I like the sound), with the same concerns? Would not caution overwhelm any society as it learns just how dangerous the universe is even without biological or mechanical intelligence bent on deliberate destruction? We used to have comets. Now we have supernovae, gamma ray bursters, and who knows what else that could destroy us (literally) without a thought.

Regardless of how advanced a civilization might be that's capable of communicating, it can never be sure that predatory ETs aren't around the corner. If Drake's "L" is defined as the time between a civilization is capable of communicating and the time it becomes scared to do so, L might be zero, or even negative! The deadlock could only be broken if one ET race could prove there was no danger, which is presumably a logical impossibility.

The principle of mediocrity demands hordes of intelligent aliens. Where are they? Hiding! Why are they hiding? Because their Nirbs know something we don't? Or perhaps because their Nirbs don't know something we don't.

I am a strong proponent of passive SETI and had been agnostic on active SETI until Brin's discussion thread. I'm not unduly concerned that currently proposed active SETI projects will increase our footprint in a meaningful way. I've been beaming signals into space for years with my ham radio and my moonbounce beacon, and I don't embody sufficient constructive paranoia to believe that they will be the ones latched onto by Ixtil from ancient Glor. Even so, as we technologically decrease our footprint by converting to digital TV and cable and getting rid of those power wasting narrowband carriers in our communications systems, is it possible that we are saving our civilization? With little effort we can make ourselves electromagnetically inconspicuous, even from nearby. Should we embrace active SETI by creating our own beacons? Or should we eschew serious programs involving long duration with high power and narrow beamwidth? Should we join what may be a Universe of Wimps by hiding out on our own planet? Has everyone already made the same decision? Will universal fear doom SETI to a continuation of the Great Silence?

Disclaimer: The opinions expressed in editorials are those of the individual authors, and do not necessarily reflect the position of The SETI League, Inc., its Trustees, officers, Advisory Board, members, donors, or commercial sponsors. ❖

Book Review:

Stargazer: The Life and Times of the Telescope

By Fred Watson

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First Da Capo Press edition, 2005

ISBN 0-306-81432-3

Hardcover, \$24.95 US

reviewed by H. Paul Shuch

The telescope is undoubtedly one of the world's most far-reaching inventions. For the past four centuries the telescope has stood at the forefront of human discovery. From its humble beginnings in seventeenth-century Holland, when a simple spectacle-maker first presented his invention to his country's military leaders, to today's colossal structures housed in space-age cathedrals, the telescope has unlocked nature's secrets. And in the past decade, the Hubble Space Telescope has brought us to the very edges of the universe, and the very beginning of time.

How did the telescope - a potent mix of art, science, and engineering - reach its present level of sophistication? The history of the telescope is a rich story of human ingenuity and perseverance involving some of the most colorful figures of the scientific world - Galileo, Johann Kepler, Isaac Newton, William Herschel, George Ellery Hale, and Edwin Hubble.

Stargazer brings to life the story of these brilliant, and sometime quirky, scientists as they turned their eyes and ideas beyond what anyone thought possible. Professor Fred Watson, one of Australia's top astronomers, writes clearly and skillfully, without technical jargon but with a dash of humor, explaining the science and technology behind the telescope, and the enormous impact that it has had for four hundred years on how we have come to understand our universe.

As extensively as this book covers the optical telescope and its applications in astronomy and elsewhere, I was a bit disappointed at its cursory treatment of radio telescopes as important scientific instruments, and of radio astronomy as a valid scientific pursuit. In its scant two pages devoted to our particular discipline, the author briefly mentions Jansky's pioneering work and Reber's first modern radio telescope, but little else. There is passing reference to Parkes, Jodrell Bank, and Arecibo, but the treatment of these extraordinary facilities is cursory at best. There is no mention whatever of SETI. It seems a shame to concentrate so completely on less than one meager octave of the electromagnetic spectrum. Despite these shortcomings, I found the book a useful overview of optical astronomy's most important instrument. ❖

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.

September 23 - 25, 2005: *Mid Atlantic VHF Conference and Hamarama*, Wrightstown PA.

October 8 - 9, 2005: *AMSAT Space Symposium* Lafayette LA.

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

October 27 - 30, 2005: *Microwave Update*, Cerritos CA.

December 9 - 11, 2005: *Philcon 2005*, Philadelphia PA.

April 22, 2006, 0000 UTC - 2359 UTC: Eighth annual SETI League Ham Radio QSO Party, 14.204, 21.306, and 28.408 MHz.

April 30, 2005: Twelfth *SETI League Annual Meeting*, SETI League Headquarters, Little Ferry NJ.

June 18-21, 2006: *SETICon06 Technical Symposium*, in conjunction with *Society of Amateur Radio Astronomers Conference*, NRAO Green Bank WV.

July 2006 (dates TBA): *Central States VHF Conference*, Minneapolis MN.

August 23 - 27, 2006: *L.A. Con IV World Science Fiction Convention*, Los Angeles, CA.

September 8 - 10, 2006: EuroSETI06, in conjunction with the Fourth International Congress for Radio Astronomy, Heppenheim Germany.

October 2-6, 2006: *57th International Astronautical Congress*, Valencia Spain.

April 21, 2007, 0000 UTC - 2359 UTC: Eighth annual SETI League Ham Radio QSO Party, 14.204, 21.306, and 28.408 MHz.

June 2007 (dates TBA): *Society of Amateur Radio Astronomers Conference*, NRAO Green Bank WV.

July 26 - 29, 2007: *Central States VHF Conference*, San Antonio TX.

August 30 - September 3, 2007: *65th World Science Fiction Convention*, Yokohama Japan.

Autumn, 2007 (dates TBA): *58th International Astronautical Congress*, Bangalore India. ❖

Hungarians as Martians: the Truth Behind the Legend

by Philip Morrison

Editor's Note: Our dear friend, colleague, and mentor, the late Dr. Philip Morrison, sent me the following letter over seven years ago. He did not want it published during his lifetime. It is now my bittersweet privilege to enter Phil's recollections into the historical record.

13 January, 1998

Dear Paul,

I hope you are on good terms with Dr. SETI. I have a rather delicate matter to send to him via you. I do not want this to be a matter of discussion now, but to stay in the archives and minds of the League until sometime when it is again relevant.

The story he cites (winter 1998 issue of *SearchLites*) of Fermi and Szilard is simply a folk tale, a delightful one perhaps, that grew in postwar Los Alamos, if McPhee is to be trusted. I know this because I am indeed the originator of the theory of Martian origin of the Hungarians. Of course the talents and energies of famous examples were taken as evidence; there, folk lore and history concur. But my reasoning was far different and I believe more cogent. Why would Martians come to the Danube? Is it nicer there than on advanced Mars? Nor would they be fearful of the *barbaroi*.

No, the answer is clearer. The Martians simply were planning, at least on a contingent basis, the eventual need to occupy Earth. Such an expedition is extraordinarily difficult beyond all history. It is naive - this was a wartime story with the tone of that era - to suppose that the first Martians on Earth would be the combatants of the forces of conquest. Even just across the channel to Normandy an invasion was not like that. The Allies knew a great deal about Europe before the landing, and had strong covert support already in place. The earliest Martians to come to Earth were indeed sent as the first intelligence assets. They would plan for a safe base, a large number on staff, and a long lead time to learn all about this planet. A few months or years would not do; you need a millennium or two, and a nation with a strange language provides the safest long-term cover. Their unconcealed intelligence, beauty (recall the Gabor!), and energy are clearly beyond earthly level. (The gypsies are a false note; that people are surely emigrant refugees from Rajasthan in northwest India, whose own language is close to Rajastani. They reached Romania

before they came to Hungary, and indeed were found over all Europe west to Spain and Britain.)

Why strong Hungarian interest in nuclear weapons? Easy; they were finally organizing to divide earthkind in a way that would weaken us profoundly. Szilard began to propose the A-bomb a few years before fission was known. The discovery of fission showed that it was necessary to set the bait. The very threat of a long nuclear war would make us simpletons much easier targets. Their superiority in such simple issues as weapons was not at risk. Get going on high strategy; the time has arrived! They did, and it almost worked, nor is the last word said.

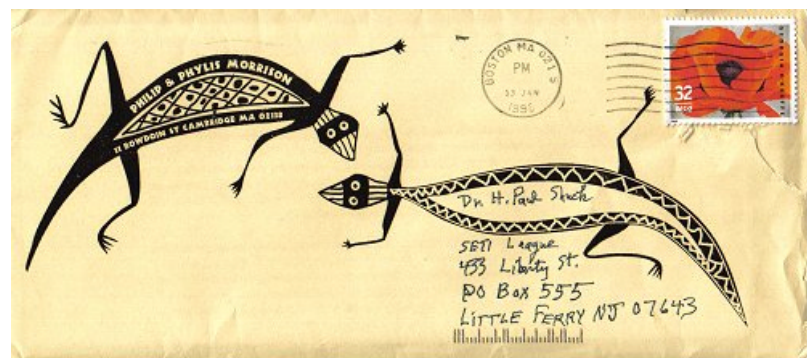
I made up and told my tale widely at Los Alamos in 1945 or maybe 46, first probably to Stan Ulam, long before the McPhee contacts, and indeed before Szilard ever came to Los Alamos, if he ever got there. (I am not certain whether or not he came postwar either; possibly he did.)

My high point in this long-elaborated spoof was telling the great Hungarian aerodynamicist Theodor von Karman, who enjoyed it greatly. "I do not deny", he said, at Cornell some years postwar. This is documented, if not dated, by my aerodynamical friend and associate of Karman, William R Sears, writing in *Physics Today* in 1986, and in his 1994 autobiography called *A Twentieth Century Life*, publisher Parabolic Press, PO Box 3032, Stanford Ca 94309. You would like Sears' book a lot.

I am pleased enough with this funny story not to lose it to local rumors recorded by a writer who wasn't there at the time. It is a delight to see just how fiction has slowly turned into slightly implausible folklore. There is of course nothing important about the credit; that is why I do not want you to print my version in rejoinder. Please, no controversies! But I thought you'd enjoy having the truth discreetly on hand, just in case.

with best wishes and a happy New Orbit to all of you,

Phil M.



When Did We Become Obsolete?

by H. Paul Shuch, Ph.D.

Think back, if you are old enough (and if you're a member of The SETI League, demographics suggest you most likely are), to the exciting days of October, 1957. The world's first artificial satellite, Sputnik 1, had just been placed in orbit. It was launched by the USSR (they had been known by this acronym for two generations, although in America they were still collectively referred to as 'The Russians.')

If you, like me, were living in the US, you were being told that The USSR was an enemy nation. The Russians, you were told, were an enemy people. Your enemy was in space - you could hear them on 15 MC (this was in the days before MHz)! America was suddenly a paranoid nation (so what's new?)

Think back, if you are old enough (and if you're a radio amateur, statistics suggest you most likely are), to the frantic days immediately post-Sputnik. The United States was trying desperately to play catch-up. Your high school guidance counselor was telling you, "You're good at science. You're good at math. Go and become an engineer; we can never have enough engineers to catch up to the Russians." (At the same time, you learn years later, your friend Sasha Zaitsev was being told by his high school guidance counselor, "You're good at science. You're good at math. Go and become an engineer; we can never have enough engineers to stay ahead of the Americans.")

Think back, if you are not yet senile (and if you're able to read this, there is still hope) to when you first got your ham radio license. The world that Sputnik had made smaller was suddenly shrinking even more. You could talk (OK, so it was probably via Morse code) to other hams, halfway around the world - maybe even to the dreaded Russians. Maybe they weren't your enemy after all.

Think back, if you are old enough (and if you've read this far, I know you are), to the excitement of December, 1961. With a little help from your USAF friends, a handful of ham radio operators had just launched OSCAR I, the world's first non-government satellite. You could hear it on 145 MC (this was still in the days before MHz)! Suddenly schools (the same ones that were training Americans to catch up with the Russians, and the same ones that were training Russians to stay ahead of the Americans) were activating ham radio clubs, building antennas, and pointing them ... up!

Now think back to last week. Surely you're old enough to have noticed your kid (or maybe your grandkid) Instant Messaging to his buddies in Russia. Maybe she doesn't remember what USSR stood for, but she knows all the countries in the world by their email suf-

fixes. Never mind that those same international suffixes used to be ham callsign prefixes. What matters is that your offspring are talking to the world - by IM and email and VOIP and cellphones - and yes, even by satellite links. Links invisible to them. Do you think they have any need for ham radio? Probably no more than we have need for spark. The world has passed us by.

Or has it? Are there a few things we can still teach our kids, our grandkids, before they put us out to pasture?

I like to think there are.

Think forward to a world linked by a telecommunications infrastructure that rivals Science Fiction's boldest predictions. Every man, woman, and child carries a communicator (possibly implanted) that links him or her to everyone else on Earth. Instantly, and cheaply, via satellite. In whatever language the participants choose. You thought Paramount Studios held all the patents on the Universal Translator/Communicator? So did I. But it wasn't long before this technology permeated our society. And transformed it.

Now think about a civilization in decline. For generations, our descendants had taken for granted a technological base that unified their world. Nobody needed ham radio; it was obsolete, overtaken by progress. Nobody needed The SETI League; it was a vestige of a bygone era, a footnote in the history books. All anybody needed was to think the right words, and the neural interface self-activated, putting any individual in instant contact with any other, at the speed of thought. The omnipresent satellites were invisible not only to their eyes, but to their mind's eyes as well.

Until they began to fail. Our machines, like ourselves, are mortal. Suddenly, there was nobody on Earth who remembered Keplerian elements. There was nobody alive who remembered Maxwell's Equations. Right ascension and declination might as well have been mystical incantations to a long-dead god. The global net fell silent, and not a soul had a clue about how to fix it.

Fortunately, a group of anthropologists and historians remembered something from their school days. A primitive creature, cryogenically preserved, who had roamed the Earth in those prehistoric days when satellites were new, and Russians and Americans thought themselves enemies. A being who used ancient, stone-aged tools like dishes and LNAs and frequency synthesizers and digital signal processing, to squeeze out crude, low-information-content signals from the stars.

So they thawed him out, and put him to work, and he saved the world.

He was an amateur radio astronomer.

He was a SETI League member.

He was you.



Remembrance:

A Spherically Curious Mind

by **Kosta Tsipis**

"If one is no Plato how can he write about Socrates?" was my first thought when asked to write about Phil Morrison, the intellectually protean, omniscient polymath MIT Institute Professor who died at home a few months before completing his ninth decade of life. He remained to the end a moral reference point to generations of peace advocates, opponents of nuclear weapons, and younger physicists alike. Only he, who carried himself the plutonium pit for the test bomb from Los Alamos to Alamogordo, assembled the Nagasaki bomb on Tinian island, flew over the devastated city three days later, and then was the first scientist to grasp first-hand the uniformly leveling effect of a nuclear explosion on human habitat, had the undisputable moral stature to fight for "no third bomb," a cause he pursued with passion the rest of his life.

Shortly after the end of the war, the last day of August 1945, Morrison became one of the founding members of the Association of Los Alamos Scientists (ALAS) that advocated international control of atomic energy. (Incidentally, with the accent on the first A ALAS means salt in Greek, but when accented on the second A the word becomes the commonplace plaintive exclamation, a word play that did not escape Morrison!)

A short time later, in December of that year, Morrison wrote the draft of the aims of the newly established Federation of American Scientists (FAS) : "...to safeguard the spirit of free inquiry ... without which science cannot flourish" and then served as its first President until 1949. During these years Morrison was an active "insider" testifying repeatedly before the US Senate on legislation to insure civilian control of atomic energy.

In 1946 he joined the Physics Department at Cornell University where he received tenure in 1948. There he remained until 1964 when he came to MIT. Early in the 1950's Morrison experienced a period of turbulence at Cornell caused by his passionate advocacy for Peace, a decidedly un-American activity according to the anticommunist storm troopers of the McCarthy era, who had yielded the cause of Peace to the Soviet Union and branded peace advocates as traitors. By 1954 Morrison had curtailed his public political activities and became "a political outsider, more academic and more dissident" in his own words. His advocacy for arms control and his opposition to the US military hypertrophy nurtured by the Cold War, found expression in books that he published with colleagues: *The Price of Defense*, *The Nuclear Almanac*, and most recently *Reason Enough to Hope*. He remained a convincing critic of resolving international conflict by combat.

Much more widely known and enjoyed were Morrison's efforts to make science more accessible and appreciated by a broader interested public: His six-part PBS series *The ring of Truth*, the long-legged *Powers of Ten* that covered 25 orders of magnitude of size from the proton to the galaxies, and the less known *Nothing is too Wonderful Not to Be True*. The all managed to resolve the tension between truth and clarity, a

permanent dilemma for those that attempt to explain natural phenomena to lay audiences.

Morrison's mastery of the language has been legendary: An internationally famous Pakistani nuclear physicist and arms controller who studied at MIT confessed recently that "taking Professor Morrison's course in classical mechanics in 1970 inspired me to switch from Electrical Engineering to Physics." That same year a student (now a Physics professor at Cornell) burst into my office and exclaimed: "Professor Tsipis, you must go listen to Professor Morrison teach classical mechanics, it is like poetry." Anyone who can make classical mechanics inspirational to Sophomores belongs with Homer and Dante in his power of phraseology. Listen to Morrison describe the first nuclear explosion in Alamogordo: "... after the explosive lenses were initiated the chain reaction proceeded to its fateful maturity."

The most widely appreciated literary contribution of Morrison were his book reviews for Scientific American, almost 1500 of them, several shared with his wife, children's educator, Phylis. In 1965 Jerry Piel the publisher of Scientific American asked Morrison to become book reviewer for the journal. Morrison wondered if he could receive some sample books before he would accept. Promptly about two-dozen books arrived at Morrison's cramped house in Cambridge. Early on a Sunday morning Morrison piled the books on a table placed on the sidewalk in front of his house and observed discretely the developing scene from an upstairs window. Within two hours passers-by had removed all the books. "Yes, I will do the book reviews" he informed Piel as the threat of a book cataclysm receded convincingly.

Many colleagues have wondered why Morrison abandoned nuclear physics in favour of astrophysics and high-energy gamma-ray phenomena. There are possibly several contributing factors among them the resonance between the physical beauty of the Universe as we humans experience it and Morrison's aesthetic proclivity, then his conviction that nuclear physics, and its readily foreshadowed sequel, high energy particle physics, would depend on Governments' largesse to fund accelerators and ever more colossal equipment, a largesse that would feature bureaucratic strings attached, political, ideological, intellectual even. Outer Space suited his political temperament and aesthetic taste.

What inspired him to propose SETI (Search for Extra Terrestrial Intelligence) was both a sense of humility that eschewed human uniqueness, his somatic conviction of the invariance of physical Law across the Universe, and an impish sense of adventure: to be the first to detect reason across the vastness of the Galaxy. But even without having achieved that feat Morrison remains an iconic presence for all who love science, crave peace, and admire the eloquent voice of reason and empathy of his spherically curious mind.

Editor's Note:

Prof. Tsipis is the retired director of MIT's Program in Science and Technology for International Security. This remembrance first appeared in Bulletin of the Atomic Scientists; it is reproduced here by the kind permission of the author.



Serendipity

by Charles Osborne

President, Society of Amateur Radio Astronomers

<<http://radio-astronomy.org>>

Serendipity. *Definition:* "Faculty of making discoveries by accident. Serendipity has been recently used in connection with the Internet, since the large quantity of information available provides chances to find unexpected relevant information while surfing the web. In Science one speaks about serendipity when the discovery is made by reasons alien to the established research experiments. For example, the discovery of penicillin."

I recently took a new look at an old book. In 1983 NRAO published Ken Kellermann's edited version of a Green Bank workshop's notes: "Serendipitous Discoveries in Radio Astronomy". I'd purchased the book ten or fifteen years ago when I was just getting interested in radio astronomy. Our recent work with the Jansky 20 MHz antenna reminded Jim Sky that there was a good treatment of the antenna's design in that book. In leafing thru it again I started reading some of Grote Reber's contributions to the text and found them newly interesting.

Grote made several observations about Jansky's discovery of galactic noise, and of his own building of the first radio telescope. The gist of it was that much of what happened, and when, was pure luck, of the "right person being in the right place at the right time." Opportune timing of the solar cycle, making the ionosphere transparent, proved fairly crucial to a number of discoveries. Grote painstakingly took a look back across the solar cycles comparing what might have happened if experiments had not been run at just the time they were.

I found a comment by Grote particularly interesting as he spoke about his own independence: "I had adequate financial resources of my own. I was not part of, or in any way dependent on, an institution, foundation or school. There were no self-appointed pontiffs, looking over my shoulder giving bad advice. During later years, I've attempted, rather successfully, to maintain this freedom and independence, which I value so highly."

Of course Grote's comments relate to both his building of a rather large dish (at a time when nobody had ever seen such a thing) in his mother's back yard, and his lifelong attempts in Tasmania to prove that "the Big Bang is Bunk". The ability to pursue a research direction, when others thought it a

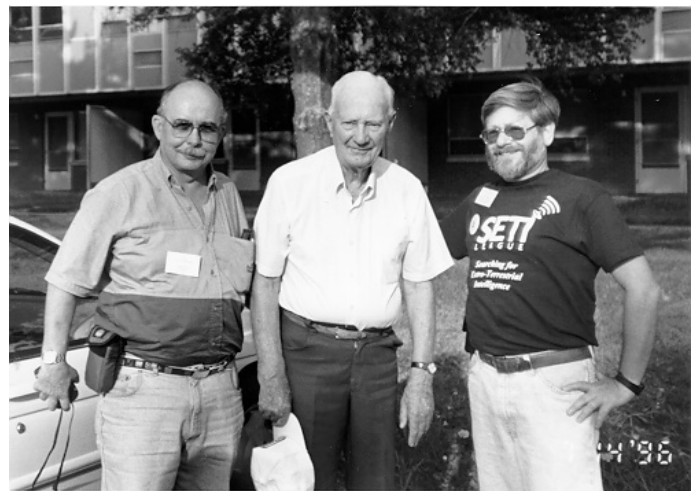
waste of time, is often the theme of great discoveries.

Wilbur and Orville Wright come to mind as similarly positioned: independent enough financially and ideologically, to pursue a course of research that others dismissed as a waste of time. The newspapers of their day showed no patience with the Wright's inability to "perform on demand". A few press conference demonstration flights, with the wind and weather not cooperating, led to the papers virtually ignoring them for two years after the 1903 first flight.

Even today, if Burt Rutan's spacecraft had fizzled once or twice, the press would have ridiculed and ignored it. NASA gets the same treatment every time a predicted "discovery" goes awry. The difference being the "wasted" cost of the project is in the first sentence of every article.

In some ways we are even worse in this regard a century after the Wrights. Scientists and engineers must predict performance or discovery in order to get funding. And they are time-lined, and graded on their performance to artificial goals. Most research funding today is tied to a quick "return on investment". Something tells me this works directly opposite to serendipity.

The great discoveries will likely be made by those with the freedom to pursue a hunch, or change course in mid-experiment to pursue a tantalizing unexpected lead. I wish you all a small taste of the personal freedom to explore, and the luck to find, "the next big thing."



Grote Reber (center) with SETI League members Tom Corwley and H. Paul Shuch, at the 1996 SARA Conference in Green Bank, WV.



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