

GuideStar



February, 2014

Volume 32, #2

At the February 7 Meeting

The Cosmic Origins of Carbon and Nitrogen

Dr. Reggie DuFour
Professor, Rice University

Carbon and nitrogen are two of the elements crucial for life.



Originally thought only to come from exploding massive stars, there is now evidence that intermediate mass stars like the sun eject significant amounts of these elements at the end of their lives (via planetary nebulae).

Reggie will talk about these new concepts and a Hubble Space Telescope program to better evaluate the contributions of carbon and nitrogen from stars producing planetary nebulae.

The GuideStar is the winner of the 2012 Astronomical League Mabel Sterns Newsletter award.



The Houston Astronomical Society is a member of the Astronomical League.

Highlights:

Hernan Contreras	6
Surprising Young Stars	9
The Search for Extraterrestrial Intelligence	10
Founder's Event	15
Kid's Outreach and Star Parties	
Urban Observing—February 6	16
SkyTools Software at 50% Discount	17
Special Awards Judging by HAS	
All About Telescopes	
Starbirth in the Neighborhood	18
CW Leonis	19

HAS Web Page:

<http://www.AstronomyHouston.org>

See the *GuideStar's* Monthly Calendar of Events to confirm dates and times of all events for the month, and check the Web Page for any last minute changes.

All meetings are at the University of Houston Science and Research building. See the last page for directions to the location.

Novice meeting:.....7:00 p.m.

“All About Telescopes” — David Haviland

See page 14 for more information

General meeting:8:00 p.m

See last page for directions and more information.

The Houston Astronomical Society

The Houston Astronomical Society is a non-profit corporation organized under section 501 (C) 3 of the Internal Revenue Code. The Society was formed for education and scientific purposes. All contributions and gifts are deductible for federal income tax purposes. General membership meetings are open to the public and attendance is encouraged.

Officers & Past President

President: Bill Pellerin C:713-598-8543
 Vice Pres: Rene Gedaly
 Secretary: Bill Flanagan.....
 Treasurer: Don Selle

Directors at Large

Ash Alashqar
 Mark Holdsworth H:713-478-4109
 Bram Weisman
 John Haynes H:802-363-8123
 Brian Cudnik..... H:832-912-1244

Committee Chairpersons

Observatory Mike Edstrom
 Audit Scott Mitchell H:281-293-7818
 Education Debbie Moran
 Field Tr./Obsg Steve Fast 713-898-2188
 Novice Debbie Moran
 Program Brian Cudnik..... H:832-912-1244
 Publicity Bram Weisman
 Outreach Bram Weisman
 Telescope Allen Wilkerson
 Welcoming Vacant
 Membership Steve Fast 713-898-2188

Ad-Hoc Committee Chairpersons

Texas Star Party ... Steve Goldberg H:713-721-5077
 AL Coordinator Doug McCormick
 GuideStar Bill Pellerin C:713-598-8543
 Outreach Bram Weisman
 Webmaster Jeffery McLaughlin
 Email: webmaster@astronomyhouston.org
 By-Laws Review ... Scott Mitchell H:281-293-7818
 Urban Observing .. Mike Rao 832-689-4584
 Audio/Visual Michael Rapp
 Video Rob Morehead
 Steve Goldberg ... Recognition

Advisors

Dr. Reginald DuFour, Rice Univ.
 Dr. Lawrence Pinsky, U. of H.
 Dr. Lawrence Armendarez, U. of St. Thomas

Dues and Membership Information

Annual Dues:Regular\$36
 Associate.....\$6
 Sustaining\$50
 Student\$12
 Honorary..... N/C

All members have the right to participate in Society functions and to use the Observatory Site. Regular and Student Members receive a subscription to *The Reflector*. *The GuideStar*, the monthly publication of the Houston Astronomical Society is available on the web site. Associate Members, immediate family members of a Regular Member, have all membership rights, but do not receive publications. Sustaining members have the same rights as regular members with the additional dues treated as a donation to the Society. *Sky & Telescope* and *Astronomy* magazines are available to members at a discount.

Membership Application: Send funds to address shown on last page of *GuideStar*. Attention - Treasurer, along with the following information: Name, Address, Phone Number, Special Interests in Astronomy, Do you own a Telescope? (If so, what kind?), and where you first heard of H.A.S.

Table of Contents

3	.....President's Message
4	.....February/March Calendar
5	.....Observations of the Editor
6	.....Hernan Contreras
9	.....Surprising Young Stars
10	.....The Search for Extraterrestrial Inteligence
15	.....Founder's Event Kid's Outreach and Star Parties
16	.....Observatory Corner Urban Observing
17	.....SkyTools Software at 50% Discount Special Awards Judging by HAS All About Telescopes
18	.....Starbirth in the Neighborhood
19	.....CW Leonis

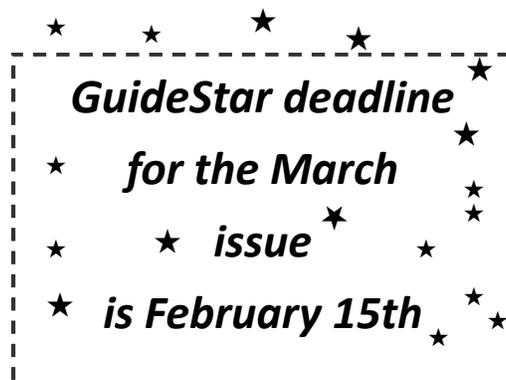
Other Meetings...

Johnson Space Center Astronomical Society meets in the the Lunar and Planetary Institute on the 2nd Friday of each month. Web site: www.jscas.net

Fort Bend Astronomy Club meets the third Friday of the month at 8:00 p.m. at the Houston Community College Southwest Campus in Stafford, Texas
http://www.fbac.org/club_meetings.htm.
 Novice meeting begins at 7:00 p.m., regular meeting begins at 8:00 p.m. Website:
<http://www.fbac.org>

North Houston Astronomy Club meets at 7:30 p.m. on the 4th Friday of each month in the Teaching Theatre of the Student Center at Kingwood College.Call 281-312-1650 or E-mailbill.leach@nhmccd.edu. Web site: www.astronomyclub.org

Brazosport Astronomy Club meets the third Tuesday of each month at the Brazosport planetarium at 7:45 p.m. The Brazosport planetarium is located at 400 College Boulevard, Clute, TX, 77531. For more information call 979-265-3376



President's Message

by Bill Pellerin, President

What's Going on with the HAS?

The HAS Board completed its every-other-month meeting on January 15 at the Houston Arboretum. The next meeting will be in March.

There was a lot of work to do and a lot of work was done.

- **Review and approve HAS budget for 2014** — The board approved a budget for 2014 provided by our treasurer Don Selle. The budget funds the various committees of the HAS based on requests from those committee chairs and estimates its income based on the income from dues and donations in 2013. The budget is subject to review and modification at every board meeting. Thanks to Don for his hard work putting the budget together.
- **Founder's Day event** — In 2013 the board funded the purchase of plaques and a historical marker for the observatory site. These are in the works and will be presented to the membership at the event in late March. (More information in this issue.)
- **Quorum for membership voting** — In November, 2013 we were unable to have our leadership election due to the lack of a quorum. The board discussed alternatives to the existing requirement in the bylaws, but decided to table the issue until a more comprehensive set of bylaws amendments can be presented to the membership.
- **Video recording of meeting presentations** — Rob Morehead discussed with the board a plan and the associated costs of video recording meeting presentations. The board agreed to fund an experimental process which records the audio and the slides from the presenter. These recordings will be posted to the Internet and will require the permission of the speaker.
- **Colorado County Tax Status** — Our application to reestablish the HAS as a non-taxable entity is under review from the Colorado County Taxing authority. We have received no results to date from that review.
- **Starline not working** — The dial-up membership messaging service 'Starline' is not working. The president recommended that the HAS terminate that service and the board agreed.
- **Group purchase of SkyTools software** — The board expressed support for establishing a group buy (at a substantial discount) for SkyTools astronomy planning software. As of this writing the capability to purchase Skytools at a discount is in place. This offer is available to HAS members only. Thanks to Bram Weisman who worked out the details with Greg Crinklaw (creator of SkyTools) and Jeffery MacLaughlin who set up the information on the HAS web site.

- **Get your dues paid for 2014!** — To take advantage of the SkyTools discount you must be a member of the Houston Astronomical Society. Among the other benefits of membership is access to the HAS observing site. You can pay at the meeting or on the HAS web site.
- **Field Trip and Observing** — announced that there will be two picnics at the HAS site this year.

Cheers,

..Bill Pellerin

President

Observations... of the editor

by Bill Pellerin, GuideStar Editor

I (and You) Can Beat a Marathon Winner

As I write this on January 20, 2014, the Houston Marathon was yesterday. My wife, Lori, and I volunteered to help with communications from a water station at mile 8 (corner of Hazard and Bissonnet) on the course.

Today's newspaper provided us with the results — the men's winner completed the race in just over 2 hours and 7 minutes. This computes to approximately 4 minutes, 50 seconds per mile for the lead runner. Looked at another way, this is about 12.4 miles per hour. I know that there is no way I could run even one mile in under 5 minutes, but the winner ran 26.2 miles at that rate.

However, I used to do a lot of recreational bicycle riding. That is, I would go out on the weekend and do, say, a 50 mile ride. I could easily ride much faster than 12.4 miles per hour on a recreational ride. So, if I were competing with the winner of the Houston Marathon, him on foot, and me on my bicycle, I'd beat him every time. You would too, since 12.4 miles per hour is a leisurely pace on a bicycle.

Both use human power, but the bicycle couples the bicycle rider's effort to the road more efficiently than the runner's effort.

What's the point? The tools we have to do astronomy are so much better at coupling our eyes to the sky that the difference between observing without a telescope and with one are similar to the difference between running a marathon and riding that distance on a bicycle.

We have an extraordinary set of tools available to us these days. In addition to a wide array of telescopes and eyepieces we have a large selection of go-to mounts with tracking capabilities, imaging devices, control software and so on. We also have access to online telescopes that we can use in the same way that professionals use telescopes — order an observation before you go to bed and pick up your data (image) the next morning. I scheduled an observation of R Crb, a variable star in Corona Borealis, for 3:00 a.m. and lost not a minute of sleep. R Crb was shining at magnitude 14.64.

With the rate of change in technology it's hard to imagine the tools and techniques that will be available to amateur astronomers in, say, 20 years. Unfortunately, it's easy to imagine the effect of expanding light pollution sources, so finding a good observing site may be a significant challenge for future amateurs.

Science on the Internet

The March, 2014 *Sky and Telescope* magazine has an article about planet hunting on the Internet and mentions all of the other opportunities to contribute to science at home from your

computer through the zooniverse.org collection of projects. The first example of this that I recall is the SETI at Home project which would analyze SETI (Search for Extra-Terrestrial Intelligence) data using your home computer when *you* weren't using it.

The zooniverse projects are different in that they rely on human perception and intelligence to analyze the data.

You may have noticed that the supernova recently discovered in M82 was discovered in an image taken on an iTelescope, a set of imaging systems deployed around the world and available to be used by anyone, for a fee.

I have been using data from iTelescope images to determine the brightness of variable stars and have been reporting those results to the AAVSO. I've also received data (images) from a friend's telescope in the Texas Hill Country.

All that said, there's nothing like being under a dark, clear sky and seeing objects in real time through an eyepiece on my telescope is an outstanding experience that is not replaced by seeing pictures of objects on my computer screen.

Until next time...

clear skies and new moons!

..Bill

Just Looking

A *GuideStar* Interview by Clayton L. Jeter

Hernan Contreras



This month in the *GuideStar* newsletter I will be interviewing Hernan Contreras...a past president of JSCAS (Johnson Space Center Astronomical Society...the NASA club). I've known Hernan for many years. I met him at one of their clubs meetings but have observed on the field with him at Fort McKavett in Central Texas several times.

Hernan is one nice fellow, a great observer, and I really love his talks at the clubs monthly meetings...he's a great speaker. Let's find out about his astronomy. Here's Hernan...



The Hernan Contreras bio...

As early as I can remember I have always had the tendency to look up. My first telescope was a 2" refractor I assembled from an Edmund Scientific kit. It was a simple affair, a 2" objective lens, several smaller lenses for the eyepiece and cardboard tubes to hold the lenses in place. It worked fairly well and I was able to find brighter objects like Venus and the moon but it was hard to focus and difficult to use without a tripod or a finder scope. Without good knowledge of the sky

and other interests coming to the forefront, the telescope fell into disuse and my interest in the sky dormant.

I was born and reared in South Texas. Though I lived in three different border towns as I was growing up, Rio Grande City, where my family has roots for many generations, is my hometown.

I graduated from Texas A & M with a degree in mathematics in 1962. After a short stint as a physical oceanographer for the Coast and Geodetic Survey in Washington D.C., I entered the U. S. Air Force in the summer of 1963 where I served as a weapons director for a little over four years. It was during a power failure in my remote assignment on an island in the East China Sea that had an epiphany. I stepped out of my quarters and looked up on to a bowl of



blazing stars. I had never seen the Milky Way so well defined and so bright. Without a man made light within 100 miles, the sky was ablaze and compelling. My interest in astronomy was rekindled.

In the fall of 1967, I left the service and started my civilian career working for Lockheed Missile and Space Company in Sunnyvale California. In November 1968 I took the opportunity to return to my home state by transferring to the Lockheed Electronics Company in Houston, Texas. I have worked for several contractors in various capacities in support of NASA until I retired in 2006.

In 1977, I graduated with a Master of Literature degree from the University of Houston at Clear Lake. In 2008, after retiring, I earned a Master of History degree from the same university.

In the early 1970's, I attempted to grind my first mirror. Without a mentor and no guide but a book that project came to a grinding halt. It was not until 1991 that I really got serious about the hobby and joined the Johnson Space Center Astronomical Society. Since then I have ground a 10" mirror, built 3 Newtonians, 1 refractor and bought a telescope with a hole in the mirror. There is a fine line between hobby and insanity.

Clayton: It's a pleasure to have you here with us for a long overdue interview. I have a few questions for you...let's start.

You mentioned building your 2" refractor as a youngster; do you still have it after all of these years? Did

(Continued on page 7)

(Continued from page 6)

you have a star atlas then to find your way around the night skies? And, how were its views?

Hernan: No, I don't have that telescope. In fact, I had all but forgotten it when a childhood friend asked me about the scope. Remembered with a start and then with all the freshness of a recrudescient dream. He helped me assemble it and we spent a lot of time looking through it. We took turns trying to hold it steady. \The views were good as far as I can remember. We were especially fascinated with the moon. It was easy to find and the craters captured our imagination.

No, we didn't have a star atlas or anyone to guide us.

Clayton: In the above photo, that is one sweet looking 12 ½" telescope. Can you tell us a little about the construction of this beauty? Tell me about its optics. Also, how do you like your single-arm Celestron SCT? Is that a 5" or 6"?

Hernan: This truly a community project—I couldn't have done it alone.

The 12 ½" mirror was ground by an acquaintance. Don was an engineer and a perfectionist and he was determined to ground the mirror to one twentieth wave accuracy. He got it to about one eighteenth and then decided he didn't want to continue. He sold it to me to finish. I tested it was satisfied that the mirror was already better than my eyesight so I just sent it to be aluminized.

A friend built the body for his own telescope. It is evident that he is a very skilled wood worker, in fact he installs hardwood floor as a profession. The body is made of left over hardwood floor lumber. His first version was a solid wood tube, later he cut the openings to make it lighter. Later he graduated to a larger scope and offered this body for sale and I bought it. Since the focal length of my mirror was longer than for the original optics I built an extension for it. The telescope works great though it is a bit heavy, but that is an advantage in getting a steadier view. The openings on the body not only make the body lighter, it lets the optics to cool down faster and it remains steadier in the wind.

Clayton: I think you were an outstanding president leading JCSAS. What years did you hold that position and who was your vice president? Looking back, what happened on your watch as "Prez" that you feel really great about?

Hernan: I served as president from 1997 to 1999. Dick Miller was the vice president. I enjoyed my tenure and never considered it a tedious chore. In fact, it was fun. There are two incidents that really stand out that occurred during my tenure. The first was the start of the Fort McKavett star parties. The other was a bit more humorous. On the fifth day of the fifth month (Cinco de Mayo) in 1999, five planets plus the sun and the moon were all lining up. A journalist from one of the local TV stations called NASA for information on the possible effects of such an event. NASA referred

the journalist to me since I was president of JCSAS. So she called me to confirm the disastrous effects of such an event. I quickly informed her that planetary alignments are not that rare and nothing is going to happen—no earthquakes or tidal waves. The only thing nice about an alignment is to look at them and we wouldn't be able to do that this one—the five planets were on the other side of the Sun. We wouldn't be able to even see this one.

Well I thought that was the end of this. There's no story, but I was wrong, a few weeks later I got a second call from another journalist from the same station requesting an interview. Again I told him there is no story but he insisted on an interview on camera. By the way, the journalist represented one of the local Spanish TV stations so the interview would be in Spanish. We agreed on a date for the interview. At the appointed time we met in front of the Saturn rocket with the camera crew in tow. As we were walking to get a better shot of the Saturn rocket, he picked up a marble sized pebble and asked, "If a meteor this size," showing me the pebble, "hit the shuttle, what would happen?"

"It would be a disaster," I responded. These words would later haunt me. We finished the interview and home. A few weeks later they started advertising the show to come. The movie clip was very impressive and very well made with all kinds of special effects. You could see giant waves crashing into buildings, earthquakes collapsing entire cities and fires raging out of control and in the middle of this pandemonium, with the Saturn in the background I was filmed saying, "It would be a disaster!"

I was just glad that this was on the Spanish station and most of my friends would not be seeing this. The show itself well made and it did present the facts as it should—it was just the advertising clip that was misleading.

Clayton: I love the two (Spring and Fall) star

(Continued on page 8)

(Continued from page 7)

parties that JSCAS holds at Fort McKavett every year. How and when did this party begin? I've attended about 4 parties there and planning on going again this year. I bet many HAS members know nothing of this event...tell us about it.

Hernan: We started that in 1997. It was somewhat accidental, but it was a good accident. One of our neighbors in Clear Lake is from Menard, Texas. One summer we went with them for the "Jim Bowie" festival. I immediately noticed the dark sky there. One of Linda's nephews, Buddy Garza, was the superintendent of the historic park and I knew that though this was not a camping park, he did have special events like re-enactments, Boy Scout activities there. So I approach him with the idea of Fort McKavett hosting a star party. He liked the idea. He needed more people visit the site to justify the budget and we needed dark skies with bathrooms. It was a win-win situation. So we've been doing it ever since.

Several years later Buddy told me that a superintendent of another park asked how he got an astronomy event in his park. "I really don't know—it just happened." Yes, it just happened.

Clayton: How hard was it to grind that 10" mirror? What was the focal ratio? How long did it take from start to finish?

Hernan: I'm always amazed to what precision you can grind a mirror with such crude and simple tools, but it's not easy. It takes a lot of patience. I already had an 8" Newtonian telescope so I could take my time.

This too was an accidental project. I was mentioned to a friend that I was gathering money to buy a larger mirror. My friend suggested that I save money and grind one. I liked the idea. At the end I realized that I saved money if I worked for 10 cents an hour, but it was a great experience and I ended with a much better mirror than if I had bought it.

I decided on a shorter focal length—I wanted a wider field of view and didn't want to climb ladders and I ended with an about f/6 mirror.

The rough grinding went pretty fast and I got to the desired focal length within a week. The polishing and parabolizing takes a lot longer. Several times I came very close to quitting, but Bob Taylor wouldn't let me. The whole process took about 10 months, but I ended up with a fantastic mirror. The advanced course in optics that I took in college became real. It was a great experience, but I don't think I'll do it again.

Clayton: How often do you observe and where? Are you visual only? Ever make it out to the HAS dark site near Columbus?

Hernan: I'm visual only. When I lived in League City I could observe from my backyard. The sky wasn't great, but it was pretty good and I had big yard with a lot of open space. Now I live in Sea-

brook with a small yard and surrounded by tall trees so I'm limited to my driveway and a small piece of sky. Before my stroke I tried to observe for a few hours every weekend. Now, perhaps once a month, but not always with a telescope. Binoculars are easier for me to handle. That is one of the reasons I really look forward to Fort McKavett.

Clayton: I was bitten by the astronomy-bug in 1961 as a boy, but didn't get serious until 1982. Why do you think we get so passionate about this hobby?

Hernan: That's a good question. I really don't know. I look at a little fuzzy and knowing the distance measured in light years just boggles the mind. I'm looking into the past and I find it compelling. My wife makes fun of me for getting so excited when I find another fuzzy.

Clayton: How would you like to see your own astronomy grow?

Hernan: I find the history of astronomy and astronomers interesting especially some of the early astronomers. I would like to expand on the basic knowledge of the world around us. I've been studying the astrolabe and I find it so fascinating. That was the instrument that every educated person had to have—like the slide rule in my era. The first technical book written in the English language was a treatise on the use of the astrolabe. It was written by Chau-
cer.

Clayton: Ever visit large professional observatories? Where?

Hernan: I've visited the McDonald Observatory in Fort Davis and Griffith Observatory in Los Angeles.

Clayton: Is the JSCAS attaining any young club members? I'm sure you agree that we need more young folks involved in astronomy?

(Continued on page 14)

Surprising Young Stars in the Oldest Places in the Universe

By Dr. Ethan Siegel

NASA Space Place

Littered among the stars in our night sky are the famed deep-sky objects. These range from extended spiral and elliptical galaxies millions or even *billions* of light years away to the star clusters, nebulae, and stellar remnants strewn throughout our own galaxy. But there's an intermediate class of objects, too: the *globular star clusters*, self-contained clusters of stars found in spherically-distributed halos around each galaxy.

Back before there were any stars or galaxies in the universe, it was an expanding, cooling sea of matter and radiation containing regions where the matter was slightly more dense in some places than others. While gravity worked to pull more and more matter into these places, the pressure from radiation pushed back, preventing the gravitational collapse of gas clouds below a certain mass. In the young universe, this meant no clouds smaller than around

a few hundred thousand times the mass of our Sun could collapse. This coincides with a globular cluster's typical mass, and their stars are some of the oldest in the universe!



Globular Cluster NGC 6397. Credit: ESA & Francesco Ferraro (Bologna Astronomical Observatory) / NASA, Hubble Space Telescope, WFPC2.

These compact, spherical collections

of stars are all less than 100 light-years in radius, but typically have around 100,000 stars inside them, making them nearly 100 times denser than our neighborhood of the Milky Way! The vast majority of globular clusters have extremely few heavy elements (heavier than helium), as little as 1% of what we find in our Sun. There's a good reason for this: our Sun is only 4.5 billion years old and has seen many generations of stars live-and-die, while

globular clusters (and the stars inside of them) are often *over 13 billion years old*, or more than 90% the age of the universe! When you look inside one of these cosmic collections, you're looking at some of the oldest stellar swarms in the known universe.

Yet when you look at a high-resolution image of these relics from the early universe, you'll find a sprinkling of hot, massive, apparently *young* blue stars! Is there a stellar fountain of youth inside? Kind of! These massive stellar swarms are so dense -- especially towards the center -- that mergers, mass siphoning and collisions between stars are quite common. When two long-lived, low-mass stars interact in these ways, they produce a hotter, bluer star that will be *much* shorter lived, known as a *blue straggler star*. First discovered by Allan Sandage in 1953, these young-looking stars arise thanks to stellar cannibalism. So enjoy the brightest and bluest stars in these globular clusters, found right alongside the oldest known stars in the universe!

Learn about a recent globular cluster discovery here:

<http://www.nasa.gov/press/2013/september/hubble-uncovers-largest-known-group-of-star-clusters-clues-to-dark-matter>.

Kids can learn more about how stars work by listening to The Space Place's own Dr. Marc: <http://spaceplace.nasa.gov/podcasts/en/#stars>.

*Silent Running****The Search for Extraterrestrial Intelligence****By Don Selle*

In April of 1960, when Frank Drake pointed the 26 meter Green Bank radio telescope at the sun like stars Tau Ceti and Epsilon Eridani he became the first human to try to detect another technological civilization on an extrasolar planet. Drake listened to them on the UHF frequency of 1420.4 megahertz (21 cm wavelength) hoping to hear an artificial radio signal, a beacon, proclaiming to the rest of the galaxy that an intelligent civilization lives there.

This most speculative of astronomical observing projects was called project Ozma. Drake named it after Princess Ozma, the ruler of Oz in L. Frank Baum's Wizard of Oz books from whom Baum claimed to have learned of the events in OZ with via radio. The project was inspired by a provocative article in the September 1959 edition of the journal *Nature* in which the authors, physicists Giuseppe

*The Robert C. Byrd Greenbank Radio Telescope*

Cocconi and Philip Morrison pointed out that for the first time in history, humans possessed the radio technology necessary to detect the radio broadcasts of other intelligent species in our galaxy. Project Ozma was based on the belief that there would be many worlds orbiting the stars in our galaxy upon which intelligent beings had evolved from primitive life, and who had developed a technically oriented civilization, capable of interstellar communication. Using our new radio technology, Drake hoped to tune in and listen.

Drake based his belief on the power of large numbers. After all, the number of stars in the Milky Way is so huge, there should be a "plurality of worlds" upon which life could arise and evolve to intelligence, even if the probability it would do so is exceedingly small. And given the age of the galaxy, and the relative youth of planet earth, it was likely that there should be tens if not hundreds of thousands of technically advanced civilizations out there many far more evolved than humanity. It was a belief that inspired Drake's search, and much of his later career, a belief that was most elegantly expressed by planetary scientist Carl Sagan,

*Carl Sagan*

also well known for his SETI work.

In 1980, Sagan's documentary series *Cosmos* aired on National Public Television. In the 12th episode which was entitled "Encyclopedia Galactica"¹, Sagan described a dream in which he searched for extraterrestrial intelligence using a great galactic computer. Based on the assumptions of a plurality of life bearing worlds, he told a story of the many other technically advanced civilizations that exist in our galaxy. Some evolve technology, only to finally destroy themselves, others would mature and survive, and of the surviving civilizations most are more mature and advanced than humanity. They are out there communicating with each other, and all humanity must do is tune in to join the club.

It is a belief which both men shared, and one that is shared in one form or another by SETI researchers today. Surprisingly, it is a belief which can be traced back to almost the beginning of recorded history.

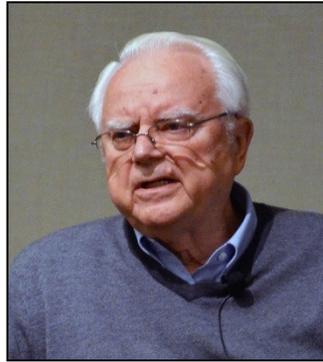
Michael J. Crowe, astronomical historian explains that "Between the fifth century flowering of Greek civilization and 1917, more than 140 books and thousands of essays, reviews and other writings had been devoted to discussing whether or not other inhabited worlds exist in the universe. Moreover... the majority of educated persons since around 1700 have accepted the theory of extraterrestrial life and in numerous instances have formulated their philosophical and religious positions in relation to it. To put the point differently, even if no UFOs hover in our heavens, belief in extraterrestrial beings has hovered in the human consciousness for dozens of decades."²

(Continued on page 11)

(Continued from page 10)

Clearly the idea of ETI (extraterrestrial intelligence) is much more than a scientific concept, and has done more than hover in our consciousness. 'There is no fixed boundary line separating scientific perceptions of extraterrestrial civilizations from popular treatments of the subject. Important features of the scientific depiction of advanced life on other worlds appear in popular culture. These shared visions originate in ancient streams of thought that nourished both scientific and popular ideas about intelligent extraterrestrial beings, and continue to influence it today.'³

Drake would search approximately six hours per day from April through July without any positive results. His efforts would spawn the branch of astronomy known as SETI, and inspire many other such searches including the very popular SETI@home³. This project uses internet based distributed computer processing on volunteer computers to analyze the data collected from several radio telescopes for traces of artificial signals, and has been supported by over 5.2 million participants world-wide who allow their computers to process this data. This program has been a great example of how researchers can enlist the public to help with their heavy computing work and has been put into use on several other programs.



Dr. Frank Drake

(On a personal note, in the early days of SETI@home I rounded up a group of 6 desktops at home and at work that ran the program almost non-stop for a couple of years. SETI@home publicized the top individuals and groups that processed the most data in a given time period, and I really wanted to make that list!)

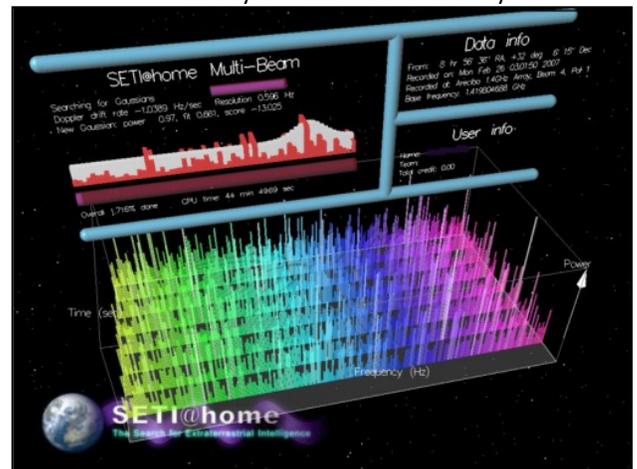
Yet after fifty-three years of searching, with a very few tantalizing though unconfirmed possible signals recorded; there is virtually nothing to show for the effort. This begs the question, what does this "eerie silence" (as physicist, cosmologist and astrobiologist Paul Davies calls it) tell us? Are we looking for extraterrestrial life in the right way? Since it is based on a belief or philosophical argument, with very little evidence to support it, this even science?

In the early days, it was especially easy to criticize SETI as being non-science, and this criticism was loud enough that since 1995, no U.S. Government funding has been available for SETI, and it is run today with private funding only. The criticism has been aimed at the fact that SETI is based on the assumption of multiple intelligent life bearing extrasolar planets and until 1999, there were no

reliable reports of the discovery of an extrasolar planet. Until then, there was also little prospect that they were even detectable. That's changed today, as the number of known extrasolar planets approaches 1,000 a couple of which are "super earths" that appear to be in the habitable zone of their planets.

What sets SETI apart from pseudoscience is that it is based on existing scientific theory, such as the theory of planetary formation and evolution of life. Its main premise is linked to these theories and developed in a well-reasoned manner which does not contradict any known physical laws. However the question of whether SETI is real science, or if it is a philosophical enterprise like Diogenes' search for an honest man depends on your outlook.

In the face of minimal evidence, we tend to accept theories if we believe them to be plausible. Stated differently, in the language of probability, our willingness to accept a given theory on limited or no evidence depends greatly on the prior probability we assign to that theory being true. This premise, known as Bayes Theorem is widely used in statistical analysis.



SETI@home screen shot

Astronomer Paul Davies explains it like this. "What prior probability should we assign to the existence of communicating extraterrestrial civilizations? Nobody

(Continued on page 12)

(Continued from page 11)

knows. If you already have good reason to believe ET is out there, and a definite idea about the nature of the signal, then you are so to speak 'primed' and easily won over. But if you think the very notion of an alien civilization is incredible, you would need very strong evidence indeed... So those who find the notion of alien civilizations a wild and unjustified speculation place SETI in the realm of pseudoscience, while others who find the idea plausible regard it is real science. You the reader must make up your own mind. What is not in question is that the methodology of SETI is real science... There is no question that the research groups are doing quality science. But are they chasing a chimaera?"⁵

Enter Nobel Prize winning physicist Enrico Fermi. During a discussion with colleagues about the potential for intelligent life in the universe which centered on the plurality of worlds and the age of the galaxy, Fermi asked the question "then where is everybody?" His point, that has become known as the Fermi Paradox is that the numbers are so large we should have already seen evidence of ETI. Stated more completely:

"The size and age of the universe incline us to believe that many technologically advanced civilizations must exist. However, this belief seems logically inconsistent with our lack of observational evidence to support it. Either (1) the initial assumption is incorrect and technologically advanced intelligent life is much rarer than we believe, or (2) our current observations are incomplete and we simply have not detected them yet, or (3) our search methodologies are flawed and we are not searching for the correct indicators."⁶

Stated this way, the Fermi Paradox gives us a roadmap to help us understand if SETI will eventually be successful. First we must look at whether the initial assumptions of SETI are correct or not. To do that, we can start with some of Frank Drake's early work, which in many ways still guides SETI today.

In 1961, shortly after completing project Ozma, Drake convened a conference at Green Bank to discuss SETI and to determine what type of radio signals could be searchers could expect to detect. Among the ten attendees was Carl Sagan.

As preparation to the conference, Drake developed an equation, now known as the Drake Equation⁷, to try to put some bounds on the number of intelligent civilizations that could be expected in the galaxy. As Drake himself would later explain, the equation was meant to stimulate thought and analysis, and not really to make any predictions. Over the years, it has surely stimulated much thought and discussion.

The Drake Equation has seven algebraic variables, 5 of which represent probabilities. The first three terms combined develop an estimate for the number of planets in the galaxy that could support life. These terms are measureable and will be defined in the not too distant future. Current estimates are based on the successful results of

exoplanet discoveries over the past 15 years, and reasonable predictions of our ability to discover earth-like planets in the habitable zone of their stars using new telescopes like the James Webb Space telescope which are soon to come online. Current estimates reach as high over 20% of the star systems in our galaxy could contain earthlike planets, and with an estimated 100 billion stars, that means possibly 20 billion places where life might be able to get started.

It is the next three terms that are very speculative and will be hard to measure. They are the probability that on an earth-like planet in the habitable zone, life will arise, and that that life will evolve intelligence, and will form a technological culture which has the capability to transmit a radio beacon or whose activities will emit radio signals that we can pick up. All three are controversial with estimates ranging from near zero to nearly 100%. The reason that these estimates span the scale is that we are the only example we know of where life arose and sent radio signals to the stars. And probability estimates are pretty well impossible with a sample size of one.

For example, take the probability that life will emerge on an earth like planet in the habitable zone of its star. This probability is very controversial. SETI pioneers like Drake and Sagan believe that given the right conditions, life will almost always emerge in the universe. The opinions of biochemists and evolutionary biologists, however is very mixed. In the 1960s and 70s when SETI was getting its start, Francis Crick, Nobel prize winner and co-discoverer of the structure of DNA once declared the origin of life to be almost a miracle as so many conditions would have to be satisfied for it to start. Likewise, French biochemist and Nobel Prize winner Jacques Monod declared that man arose in the universe by chance and now knows he is alone in its immensity. By contrast, in a 1995 book, biochemist and Nobel Prize winner Christian de Duve declared life in

(Continued on page 13)

(Continued from page 12)

the universe a “Cosmic Imperative”.

Development of intelligence is another controversial factor in Drake’s equation. Simple life is not complex enough to become intelligent, and while it may seem so in our case, evolution does not favor in-

$$N = R_* \cdot f_p \cdot n_e \cdot f_\ell \cdot f_i \cdot f_c \cdot L$$

The Drake Equation

where:

N = the number of civilizations in our galaxy with which radio-communication might be possible

and

R_* = the average rate of star formation in our galaxy

f_p = the fraction of those stars that have planets

n_e = the average number of planets that can potentially support life per star that has planets

f_ℓ = the fraction of planets that could support life that actually develop life at some point

f_i = the fraction of planets with life that actually go on to develop intelligent life (civilizations)

f_c = the fraction of civilizations that develop a technology that releases detectable signs of their existence into space

L = the length of time for which such civilizations release detectable signals into space

creasing complexity which is necessary for the emergence of higher life forms. Based on the fossil record, it took life on earth over 300 million years before it caught on earth. After life arose, it took another 3.5 billion years for it to become complex enough to support multicellular organisms, and another 500 million years for intelligence to emerge. Intelligent life on earth has existed a mere moment in a geological time scale. Yet Sagan and Drake set the probability somewhere between 1% and 100%.

And what about the nature of the signal that early SETI researchers were looking for? Is it plausible that an advance race of aliens with the technology to do so would set up a beacon proclaiming to the universe “HERE I AM”? Perhaps an analogy is in order here, and I hope you will indulge my use of one that is not complete.

I like to think of this question in terms of the development of SONAR for anti-submarine warfare. At the turn of the 20th century, inventors were beginning to learn how to transmit sound signals which would reflect off submarines as echoes which when received could be used to determine the direction and range to the submarine. It soon became clear that this “active” sonar approach had some major drawbacks.

It was quite difficult especially with the technology of the time to generate sound pulses which were loud enough to reflect off a submarine at a reasonable range and still be loud enough to be detected. It also became clear that a submarine with the right hydrophone equipment was much better able to detect a surface vessel using active sonar than it was for the surface vessel to detect the sub.

As a result, active sonar became a secondary means of detecting submarines, to be used only in limited situations and “passive” sonar systems were developed. Passive sonar allows ships and submarines equipped with sophisticated hydrophones and high tech real time

signal processing equipment to run silent while listening to the sound environment of the ocean. Using this technique, telltale sounds are used to detect and identify other vessels at great distances.

From its inception, SETI has been like a submarine listening for ships using active sonar. But these interstellar beacons may not exist, because they are not practical. It has been estimated that a beacon strong enough to be detected at a distance of 1,000 light years would take a large fraction of the global electrical generation capacity. While this might not be a major problem for an advanced alien civilization to achieve, it will take significant resources.

In addition, the great distances involved also equate to time. Since radio signals travel at the speed of light in space, it would take 1,000 years for that radio signal to make a one way trip from the alien civilization to our receivers. Our response would take at least another 1,000 light years to be received by the aliens. Two way communication would be tedious at best. And like the ship using active sonar, the beacon would by its very nature call attention to the advanced civilization that sent it. That might not be a good thing, as all intelligent life may not be peaceful and altruistic. There are many other plausible reasons why an alien civilization may not want to broadcast a beacon.

In addition, our own experience shows that it might be naïve to expect to receive inadvertent radio emission, like television and radar from an advanced civilization. As our technology has matured, more and more of our own transmissions have been put onto fiber optic cables. Even the strength of military radar signals has decreased as our receiving and signal processing technologies have gotten more

(Continued on page 14)

(Continued from page 13)

advanced. It's possible that an alien civilization more advanced than humanity might be practically running silent.

So has the 50 plus years of SETI silence been due to the fact that the search is based on some false assumptions? Perhaps it is, and perhaps we do need to reconcile ourselves to being one of a very few intelligent species in our galaxy.

To be fair, until now, SETI has searched a limited amount of the sky, and for very limited periods of time. At the pace that we are going, Seth Shostak a principal researcher at the SETI Institute has estimated that we will have listened long enough, to enough of the sky that by 2020-2025 we will have enough coverage to have made the first verified detection. While SETI may be speculative, the effect that a positive detection of an alien civilization would have on humanity is enormous, so it is probably worth the cost and professional risk to keep looking.

1. http://en.wikipedia.org/wiki/Encyclopedia_Galactica Cosmos segment:
<https://www.youtube.com/watch?v=3Os3DDGgApk>
2. Michael J. Crowe – *The Extraterrestrial Life Debate 1750-1900* Dover edition, 1999

3. George Basalla – *Civilized Life in the Universe* Oxford University Press, 2006
4. Seti@home: <http://setiathome.berkeley.edu/>
<http://en.wikipedia.org/wiki/Seti@home>
5. Paul Davies - *The Eerie Silence* Houghton Mifflin Harcourt, 2010
6. <http://en.wikipedia.org/wiki/SETI>
7. <http://www.seti.org/drakeequation>
http://en.wikipedia.org/wiki/Drake_equation

(Continued from page 8)

Hernan: Yes we do and that was one of our goals this past year to bring in more people especially younger ones. Of course, at my age everyone is younger. It seems to be paying off. We try to have star parties at schools but it is difficult because all the observing areas that is parking lot are lighted.

Clayton: Do you have any helpful advice to pass on to observers just starting out in astronomy?

Hernan: I would start out with binoculars and join an astronomy club before you buy a telescope. See the telescope some of the members have and look through them before you buy. In general astronomers are friendly and happily share in their hobby as long as you don't have a flashlight. This is the best way to find a telescope that fits your life style and the knowledge of the sky to enjoy it.

Clayton: Is there an email address that you have that a Houston Astronomical Society member could contact you for an additional question or two?

Hernan: I'm available at hac@los-tejanos.com

Clayton: Thanks Hernan for taking the time to share your interest and thoughts within our HAS newsletter, the *Guide Star*. We wish you

luck with all of your astronomy interests. Please come visit our society when in the Houston area, we'd love to see you.

Hernan: Thanks Clayton

Clear skies always, Clayton

Clayton is an avid SCT visual observer and a longtime member of the Houston Astronomical Society. Contact him at: stonebloke@gmail.com

Founder's Event

March 29, 2014

There will be a special event at the Columbus Dark Sky site on the afternoon of Saturday, March 29, 2014.

With the recent passing in 2013 of Bob Rogers, the Observatory Chairman since 2007, it was requested to do something at the site to recognize and remember Bob for everything he has done for the site. It was then realized that the original developers of the site have not been recognized. A committee was formed in July 2013, to determine the best way to recognize Bob and the members who built the site from 1979 to the dedication in 1983. For the original members working on the site and the building we will unveil a bronze plaque to be placed inside the building. For Bob, there will be a separate "member's observatory" in the new small observatory section of the site.

In addition to the plaque and new observatory, several other presentations will be done. A plaque to recognize all the Observatory Chair

holders since 1983 will be placed in the warm-up room of the observatory. There will also be a plaque to recognize the Astronomical League Master Observers that are HAS members. Two recognition plaques will be presented for the discoveries that were made at the site. These will be for Comet C/1996 B1 Szczepanski and supernova 1994S discovered by Larry Mitchell.

The date coincides with the annual Messier Marathon and an HAS picnic where food will be served. So please mark your calendar and plan to be at this historic event.

The schedule of activities for the day will be in the March *GuideStar* and will be on the HAS web site.

Kids Outreach & Public Star Parties

Bram Weisman — coordinator for Outreach and Public Star Parties

Mission Bend Elementary - Science Night

February 18, 2014, 6:30PM-7:30PM
16200 Beechnut Houston, TX 77083
Expected visitors: 50

Houston Arboretum - Springtime Star Party

Jupiter, some of the brighter deep sky objects like Pleiades, ET, Double Cluster, Eskimo Nebula, Great Orion Nebula will be shown to our guests at the Arboretum.
March 22, 2014, 8:00 PM - 10:00 PM
Houston Arboretum, 4501 Woodway Drive, Houston, TX 77016

Tents In Town - Urban Camp

April 5, 2014, 8-10pm (estimated)
Zindler Park, 7008 South Rice, Bellaire, TX 77401
Expected visitors: 300

Fathers and Flashlights (Cypress) - Urban Camp

April 5, 2014, 8-10pm (estimated)
Pope Elementary, 19019 N Bridgeland Lake Pkwy, Cypress, TX 77433
Expected visitors: 300

Houston Arboretum - Pink Moon

A party mostly for observing the Full Moon (rising above the trees around 8:15 pm), with our guests at the Arboretum. Also Jupiter, and maybe some of the brighter clusters (Pleiades) may be available.
April 12, 2014, 8:30 PM - 10:30 PM
Houston Arboretum, 4501 Woodway Drive, Houston, TX 77016

Observatory Corner

By Mike Edstrom, Observatory Committee Chairman



Private observatories are moving along we have 9 under contract, 2 with someone interested in and 1 open. Two buildings are under construction and I am told 3 more will start soon.

The C-14 has been repaired and is back to normal there were a couple of problems and thanks to Chris Ober it has been repaired. Please report any issues to me immediately.

We have received enough donations toward Bob's astrophotography dome that we will be building the deck and installing the 8' dome in late February.

Please keep up the great attendance at the monthly events at the Dark Site we love to see the large crowds and enthusiasm.

As a safety reminder please read the sign posted on the side of the metal building at the Dark Site which has directions to the hospital and contact information for the sheriff's department it also has the address to the site in case of a medical emergency.

And the Work Goes On

I **need** to remind everyone that we need to start filling out Log Reports at the site so I can give this information to the Fondren Foundation. The property is on a 99 year lease and part of the Lease agreement is that HAS needs to report every year to the Fondren Foundation that the property is being used. The Log Reports are located in the box in the middle of the field. Just open the cover, fill out the report and then slide it into the slot that is in the inside of the cover and then close the box. It is very important that **everyone** fill out a Log Report so that we are showing that the Observing site is being used. Your help on this is very much appreciated.

If you have a Randalls card, and have not done so, please have it coded for the Houston Astronomical Society. Our number is #6618. The Society gets 1% of the gross sales that member spends at Randalls. Randalls totals up the amount spent each quarter and will send us a check if the amount goes over \$2,500, otherwise the total rolls over to the next quarter of zeros out at the end of the calendar year. So please link your Randalls card to the Houston Astronomical Society so that the society can benefit from this Randalls program. Our number is #6618. This is very easy to do, just go to the Courtesy Booth and tell the person there what you want to do.

If you have any suggestions or thoughts for the site, please let me know.

Thank you,

Mike Edstrom

medst22531@msn.com

Urban Observing Event — February 6, 2014

By Mike Rao

We will be shooting for an urban observing in Hermann Park at the green area across from the HMNS, on Thursday Feb 6th beginning at 7pm. Some of the bright objects that should be visible just after 7pm: Waxing Moon (1st Quarter), Jupiter, The Pleiades, Orion Nebula, Andromeda Galaxy (limited to telescope aperture), Double Cluster, Castor (double star), and much more.

If the weather is forecast to be better on another nearby day, we may change to that day - plenty of notice will be provided.

If you are interested in coming out, contact me off-list at mike.rao@optimus-us.com

For those that have made it to Bear Creek in the past, please reach out as I would like to setup an observing there as well. The goal is to get out at least twice a month from now until it's too hot to be out at night!

Another Benefit for HAS Members

SkyTools Software at a 50% Discount!!



SkyTools is popular astronomy software from Skyhound, tailor made for the observer. Skyhound has long offered group buy pricing on a graduated scale with discounts up to 50% off the retail pricing. This required collection of orders and payments to be submitted by an officer of the club to Skyhound. HAS has done this successfully at least twice in the past. HAS is pleased to announce that Skyhound has generously agreed to provide links to all three version of SkyTools at the maximum discount of 50%. HAS members will be able to benefit from group buy prices on demand. No more waiting for the "group" to congeal.

This offer is limited to digital downloads only. The links are available in the secure "Members Only" section of our website under "Special Offers".

To learn more about SkyTools software visit the Skyhound website at www.skyhound.com

Science Fair 2014

Special Awards Judging by HAS

By Debbie Moran

This year's Science and Engineering Fair Special Awards judging will be on Thursday afternoon February 20th. If we are going to participate again, we will need some judges to help out. Richard Nugent is unable to be head judge this year, so we are looking for someone interested to lead this year's effort. If you would like to judge this year, contact me at debbiemoran@earthlink.net. I will put out a call for judges soon on the HAS e-mail list and at the February meeting.

Novice Presentation—February, 2014

All About Telescopes

By Debbie Moran

The Novice presentation for the February meeting will be All About Telescopes presented by David Haviland. This will be an introduction to telescope designs and how to match a telescope to your needs. Also, Allen Wilkerson, chair of the Loaner Telescope Committee will tell us about the loaner telescope program which provides a number of telescopes to be borrowed by members in good standing after two months of membership. This is an excellent way to become familiar with different types of telescopes before you invest in one.

Looking toward March, Bret Gantry will tell us everything we need to know about observing the Moon.

Starbirth in the Neighborhood

By C.C. Petersen, *The Spacewriter*, <http://thespacewriter.com/wp/>

Galaxies are huge collections of stars, gas, dust, black holes, and planets. The Milky Way is a good example of a spiral galaxy. It also happens to have a bar of gas and dust and stars across its center, and many places where stars are being born. It turns that when astronomers look at other galaxies, particular spiral galaxies (and many colliding galaxies), they also see regions of starbirth.



The spiral galaxy M83 as seen by Hubble Space Telescope. Courtesy NASA/ESA

The Hubble Space Telescope has been astronomy's "go to" machine in space when astronomers want to look at something like a distant galaxy. This Hubble image shows the pinwheel (spiral) galaxy M83, which lies in our southern hemisphere skies in the constellation Hydra. It's about 15 million light-years away, and, as you can see here, is ablaze with starbirth regions spread across 50,000 light-years of space.

The pink blobs are the starbirth nurseries sitting on the edges of dark dust lanes. They are churning out hot young stars that are extremely bright in ultraviolet light. The UV radiation heats up surrounding clouds, and they are what we see glowing in hot pink (in this image). Those hot young stars are busily evaporating nearby gas clouds with their UV light. They emit strong winds which also disrupt their nurseries. Eventually, the starbirth crèche disappears, revealing the newborn star. Those hot young stars live short, energetic lives—perhaps existing only about 10 million years before exploding as supernovae. When they do die this way, the blast blows huge clouds of material out to space, blowing "bubbles" in space. HST has seen nearly 300 of these death bubbles. All this activity makes M83 a great place to study the dynamics of star birth, star death, and the contributions these events make to the galaxy.

It's not just professionals who are studying this galaxy. M83 is being used as a target for citizen science, too. The idea is to come up with estimated ages for around 3,000 star clusters in this galaxy. The project is called Star Date: M83, a collaboration between the Space Telescope Science Institute and Zooniverse, creators of several citizen science projects including Galaxy Zoo, Planet Hunters, and the Andromeda Project (go to www.zooniverse.org to see the full list). The M83 project is launched on Monday, January 13, 2014. If you're interested in participating, visit <http://www.projectstardate.org>.

What will you be asked to do? You and others will use the presence or absence of the pink hydrogen emission, the sharpness of the individual stars, and the color of the clusters to estimate ages. Participants will measure the sizes of the star clusters and any associated emission nebulae. Finally, you and your fellow citizen scientists will "explore" the image, identifying a variety of objects ranging from background galaxies to supernova remnants to foreground stars. If you've never done citizen science before, it's quite interesting to participate in. I was part of Galaxy Zoo for awhile, and the people who ran that project provided all the information we needed to start classifying galaxies by their shapes.

M83 is a gorgeous object, and I think that people who study it (professional and citizen scientists) will come away with an amazing insight into the lives and deaths of stars in this distant galaxy.

*This content distributed by the
AAVSO Writer's Bureau*

Shallow Sky Object of the Month

CW Leonis

Object: CW Leonis
Class: Variable / Carbon Star
Constellation: Leo
Magnitude: 11 to 15
Period: 649 days
R.A.: 09 h 47m 57 s
Dec: 13 deg 16 min 43 sec
Size/Spectral: C 9.5 (Carbon star—red)
Mass: .8 Solar masses
Distance: ~400 ly
Optics needed: Telescope

Why this is interesting

This variable star was first cataloged in 1969 by Eric Brecklin and his research team. A large cloud of dust surrounds this star and the images made of this star have led to numerous erroneous conclusions about the nature of this object. (More about that to follow.)

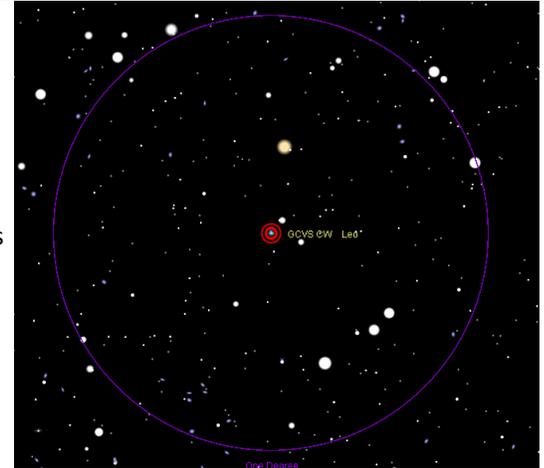
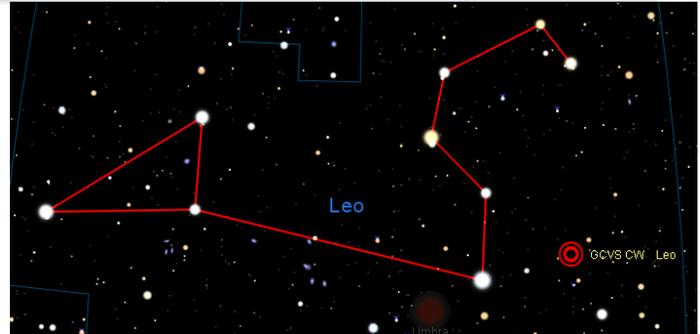
As low mass stars grow old they cast off their outer layers (which are later seen as a planetary nebula) and become a white dwarf star — one that is no longer lit up because of nuclear fusion energy. A white dwarf glows only from residual heat.

It has been determined that this star, during the prime of its life, when it was on the main sequence, was about 4 solar masses in size — still a low mass star, since the transition from low mass to high mass occurs at about 8 solar masses. This is a star that long ago left the main sequence, became a red giant, began helium burning, and became a red giant star for the second time (on the Asymptotic Giant Branch). Most of the mass of this star has been lost in late life ‘burps’ that throw the remaining material into space.

This is a C class (color) star, a special color classification for carbon stars had to be established to properly describe the color of these stars.

The product of the fusion of Helium (which was created by the fusion of Hydrogen when the star was on the main sequence) is Carbon and Oxygen and this material is now at the core of the star. The Carbon gets carried to the surface of the star due to the convection of the remaining Helium and Hydrogen shells between the core and the surface. It is this carbon that contributes to the red color of the star at this late stage of its life.

One of the images of this star that has caused a lot of discussion is on GoogleSky (google.com/sky), although when I tried to search for the object in GoogleSky I got a ‘Search not Responding’ error. Never mind. The short story is that CW Leonis is the doomsday planet Nibiru,



CW Leonis

Top: Finder for CW Leonis

Above: The circle is 1 degree on the sky. North is up.

Star charts generated by TheSkyX © Software Bisque, Inc. All rights reserved. www.bisque.com

headed for the Earth. A quick search of the Internet will locate numerous references to this nonsense.

Parking at the University of Houston Main Campus

For the monthly Houston Astronomical Society Meeting

The large-scale map at the right shows the location of the 15F parking lot, on the west side of Cullen Boulevard.

The detail map (below) was provided by the University of Houston Parking department to define the area that is available for parking while attending the Houston Astronomical Society monthly meeting. This parking is available from 6:30 p.m. until 10:00 p.m. on the Friday night of the HAS meeting (usually the first Friday of the month).

This parking is free. If you get a notice from the UH campus police on the night of the meeting, call the UH Security office and let them know that this area has been made available on HAS meeting night by the Parking Department.



From Google Maps



Houston Astronomical Society

P.O. Box 20332

Houston, TX 77225-0332

General Membership Meeting

The Houston Astronomical Society holds its regular monthly General Membership Meeting on the first Friday of each month, unless rescheduled due to a holiday or a conflict with other events at the University of Houston.

Board of Directors Meeting

The Board of Directors Meeting is held on dates and at locations scheduled by the board. Information provided to *GuideStar* will be published. The meetings are open to all members of the Society in good standing. Attendance is encouraged.

GuideStar Information

The H.A.S. *GuideStar* is published monthly by the Houston Astronomical Society. All opinions expressed herein are those of the contributor and not necessarily of Houston Astronomical Society. The monthly Meeting Notice is included herein. *GuideStar* is available on the HAS web site to all members of H.A.S., and to persons interested in the organization's activities. Contributions to *GuideStar* by members are encouraged. Electronic submission is helpful. Submit the article in text, MS-Word format via email BillPellerin@sbcglobal.net. Copy must be received by the 15th of the month for inclusion in the issue to be available near the end of the same month. Or, bring copy to the General Membership Meeting and give it to the Editor, or phone to make special arrangements.

Editing & Production: Bill Pellerin,

713-880-8061

Email: BillPellerin@sbcglobal.net

Advertising: Advertisers may inquire concerning ad rates and availability of space.

The Houston Astronomical Society welcomes you to our organization. The HAS is a group of dedicated amateur astronomers, most of whom are observers, but some are armchair astronomers.

The benefits of membership are:

- Access to our 18 acre observing site west of Houston -- a great place to observe the universe!
- A telescope loaner program -- borrow a HAS telescope and try observing for yourself!
- A monthly novice meeting, site orientation meeting, and general meeting with speakers of interest.
- Opportunities to participate in programs that promote astronomy to the general public (such as Star Parties at schools)
- A yearly all-clubs meeting for Houston area organizations
- Meet other amateurs and share experiences, learn techniques, and swap stories

You're invited to attend our next meeting.

You'll have a great time.

Houston Astronomical Society

Meeting on Friday, February 7, 2013

7:00 Novice Meeting, room 116 Science & Research 1 Bldg

8:00 General Meeting, room 117 Science & Research 1 Bldg

University of Houston

Directions to meeting:

From I-45 going south (from downtown)

- exit at Cullen Boulevard
- turn right on Cullen
- turn right into the parking lot (past the parking garage)
- Science and Research is across the street (2nd building back)

From I-45 going north (from NASA/Galveston)

- exit at Cullen Boulevard
- turn left on Cullen
- turn right into the parking lot (past the parking garage)
- Science and Research is across the street (2nd building back)

Parking:

There is Free Parking. See Parking map and detailed information on parking on the preceding page.