

GuideStar



August, 2012
Volume 30, #8

At the August 3 Meeting

Jupiter's White and Red Oval Storms - 2011-2012

Dr. Richard Schmude

Does Jupiter's Great Red Spot change shape over time? What causes oval storms on Jupiter to change speed?

Richard Schmude will explore these two questions in a presentation that focuses on the red and white oval storms on Jupiter. Richard will describe the WinJUPOS software package and present his measurements of over two dozen oval features on Jupiter, including measurements of the Great Red Spot and Oval BA made during 2011 and 2012.

Richard will also describe one particular oval that changed speed around October 1, 2011, and discuss possible causes for this change. Finally, Richard will present some ideas for future work.



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

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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.

Schedule of meeting activities:

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

Novice meeting: 7:00 p.m.

John Haynes — "Telescopes and Mounts for Astronomers"

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.

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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.

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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 First Colony conference Center. Novice meeting begins at 7:00, regular meeting begins at 8:00. Web site: <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-mail bill.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

★ ★ ★ ★ ★

GuideStar deadline

★ **for the September** ★

★ **issue** ★

★ **is August 15th** ★

President's Message

by Gordon Houston, President

Hello HAS,

The Houston Astronomical Society has exceeded its all time previous membership high of the late 1990's per our Treasurer Warren Murdoch. His last count totaled 410 members and new people are joining every day.

This membership growth is due in no small part to the work of our award winning webmaster, Jeffery McLaughlin. I believe that this does not tell the whole story. I believe the 2012 Leadership Team is working collectively to enhance the whole HAS member experience to support the membership growth. The outward signs of this are the quick response of welcome letter, name tags, observatory orientations, communications with our netslyder and award winning newsletter, the *GuideStar* and Bill Pellerin. Join us for the formal presentation of the Mabel Sterns and Webmaster awards to Bill and Jeffery at the August 3rd meeting.

Another important aspect is content and program. People joining through the website must see things of value, which is clearly evident in the programming of novice and speakers by Justin and Brian. They see activity that is interesting in every facet, so they make the decision to join. I could mention every

leader and their roles, but collectively, I am proud of our team effort. Our nominating committee will be formed at the August board meeting, with a task of identifying candidates for next year's leaders. I encourage each of you to consider joining the team.

Finally, I first want to recognize the Two Minute Drill observing tip presenters in July Lunar-Arnie Hauswald, Planetary-Bram Weisman, and Deep Sky-Alan Rossiter. I look forward to hearing the August TMDs.

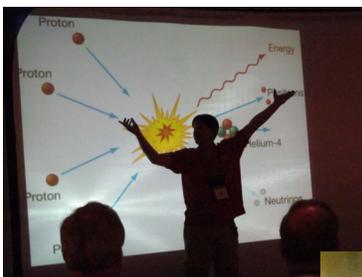
Until then, keep observing and Clear Skies.

Ad astra,

..Gordon Houston

President HAS

Photos from ALCON 2012



Left — Michael Bakich explains how stars work during one of his ALCON presentations



Left — The Night Sky Network table at ALCON 2012

Right — the Astronomical League table at ALCON



Right — the accelerator ring at Fermi Labs near Chicago



Observations... of the editor

by Bill Pellerin, GuideStar Editor

A Busy July

It has been a busy July, astronomically speaking. I attended the Astronomical League conference (ALCON) near Chicago (July 4-7) and made a trip out to west Texas.

ALCON Conference 2012

The HAS is a member club of the Astronomical League. You are likely aware of the AL observing awards that are often handed out at monthly HAS meetings by Amelia Goldberg. There are observing clubs for every interest and for every range of observing skill and knowledge. If you're not familiar with the AL observing programs, check them out at:

<http://www.astroleague.org/al/obsclubs/AlphabeticObservingClubs.html>



40" Refractor at Yerkes Observatory, Williams Bay, WI

As a HAS member you receive the AL magazine the *Reflector* and have access to materials on the AL web site.

The conference was a big success, with talks from Richard Schumde (our HAS presenter this month), David Eicher (editor for *Astronomy* magazine), Michael Bakich (*Astronomy* magazine), Arne Henden (AAVSO), and others. Mike Simonsen (AAVSO) was also there from his home in neighboring Michigan. You may remember meeting Mike at the 2011 Texas Star Party. By the way, Mike was awarded the Leslie Peltier award at this year's conference. The award

recognizes his contribution to observational astronomy.

There were three afternoon trips — to the Adler planetarium in Chicago, to the Yerkes Observatory in Williams Bay, Wisconsin, and to the Fermi Labs in Chicago. Yerkes is a very interesting site with the 40" refractor telescope now functioning as a museum piece in the largest of the three domes on the site.

New Astronomical League Observing Program

One of my reasons for going to the AL conference was to present my new observing program 'Observing Stellar Evolution' to the council. I was able to make this presentation on Tuesday, and the program was accepted by Thursday. I don't know how long before

the program appears on the AL web site, but I hope you'll check it out when it becomes available. I'd appreciate your feedback on it.

I had a chance at the conference to chat with the creator of the Variable Star observing program and got some tips on how to manage an observing program.

A (short) trip to West Texas

I wasn't able to go to the Texas Star Party this year, but I did make a weekend trip to west Texas (July 13-15). It's a long way to go for a short time to be there, but when I got there the skies were magnificent. On the Friday night the seeing was reported by the McDonald staff to be .7 arc seconds and the skies were quite clear. The Milky Way lit up the sky in a way that you only see at a very dark site. If you haven't had the opportunity to see the Milky Way from a very dark place, you need to plan your trip now. It's an amazing sight to see. There isn't anything that I've seen through a telescope that compares with the view of our home galaxy from West Texas. Nothing between my eyeball and the sky. Fantastic.

Borrowing from the Houston Public Library

After a bit of fiddling I figured out how to borrow e-books from the Houston Public Library. You need a e-reader and a library card (free at any HPL site). I borrowed a book *Cosmic Numbers* by James Stein and am enjoying browsing through chapters of interest. It's not clear how the HPL enforces the two-week borrowing period. I'll see when my two weeks runs out.

Until next time...

clear skies and new moons!

..Bill

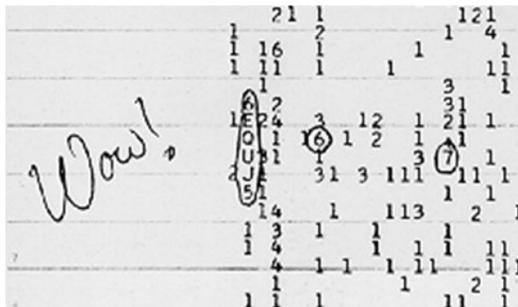
The Wow! Signal

by Don Selle

When you think of the possibility humankind's first contact with an extraterrestrial civilization, what image pops into your mind?

Its probably one of a number of movie-influenced images. Depending on your age, it might be of Richard Dreyfuss in Spielberg's classic "Close Encounters of the Third Kind." If you are a bit younger, it might be Will Smith in the 1996 movie "Independence Day". If you are a Trekkie of any age (like my wife), your image is from the movie "Star Trek First Contact", which was released later in 1996. In that movie, Zefram Cochrane (James Cromwell) assisted by First Officer William Riker (Johnathan Frakes) blast off in a home-built rocket ship to the beat of Steppanwolf's classic song "Magic Carpet Ride". Once on orbit they activate the first warp drive, attracting a passing Vulcan ship.

For many amateur astronomers and devotees of Carl Sagan, their image of first contact might be from the 1997 movie "Contact" based on Sagan's book of the same title. In the movie, Jody Foster, in a wide brimmed hat atop her car is listening intently to the hiss on a set of earphones, eavesdropping on the VLA radio



telescopes featured prominently behind her. She perks up as the hiss gradually changes and the loud heartbeat like sound of First Contact pounds in her ears. Since Sagan was in the SETI (Search for Extra-Terrestrial Intelligence) business, we would expect this portrayal be the most authentic.

While all of these images are compelling and make for good drama, the reality of first contact may have been much more mundane. Thirty-five years ago, on Aug 18, 1977, in Columbus Ohio, astronomer Jerry Ehman was reviewing computer printouts at his kitchen table. The data, from Ohio State University's "Big Ear" radio telescope SETI survey, contained a signal that was so startling that when he saw it, Ehman circled it and wrote Wow! in the margin. A rather whimsical essay about the Wow! signal, aired on NPR (in recognition of 50 years of SETI) noted that this very famous signal was actually received at nearly midnight on August 15 1977, arriving just a few hours before Elvis Presley died (<http://www.npr.org/blogs/krulwich/2010/05/28/126510251/aliens->

[found-in-ohio-the-wow-signal](#)).

The history of the Big Ear radio telescope, and the Wow! signal is truly fascinating (and can be found at the Big Ear Memorial Website www.bigear.org). Completed in 1963 after seven



years of construction, the Big Ear consisted of a tiltable flat reflector 100 feet tall by 340 feet long which directed radio signals from space onto a parabolic reflector that measured 360 feet long by 70 feet high. The parabolic reflector focused the radio waves into two horn antennas 410 feet away, where the signal was fed into the receiver and monitoring computers. The reflectors were made up of steel beams and rods covered with a fine wire mesh which was very opaque to radio waves. The whole arrangement sat on a three acre ground plane made up of aluminum sheeting over concrete.

The Big Ear had the sensitivity and resolution of a dish radio telescope of about 157 feet in diameter. From 1963 to 1971, it was used to survey the radio sources in the sky from 63 degrees north declination to 34 degrees south declination. It recorded almost 20,000 radio sources, almost 60% of which were previously undiscovered.

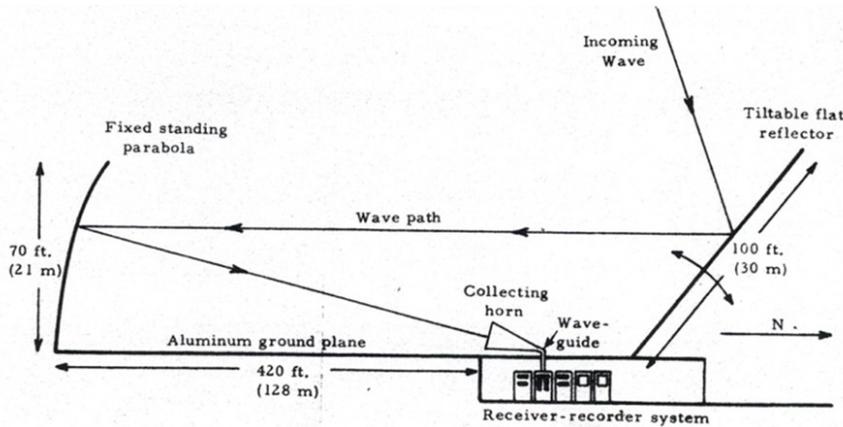
The search for extraterrestrial intelligence began in earnest in 1959 with a paper by Phillip Morrison and Giuseppe Cocconi. In the paper, the authors suggested that the microwave band be searched for evidence of extraterrestrial civilizations, and developed a series of frequencies and targets to investigate.

In 1960, Cornell university astronomer Frank

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Drake carried out the first modern SETI investigation using the 26 meter Green Bank radio telescope. Drake organized the first SETI



conference in 1961 that inaugurated SETI as a scientific endeavor. He developed his famous equation for determining the number of communicating civilizations in the Milky Way galaxy.

By the early 1970s, NASA began to support SETI investigations, and interest increased dramatically. The driver was a NASA-funded study called Project Cyclops, which included Drake. Project Cyclops was largely a paper study which proposed an array of 1,500 radio telescopes to search for extraterrestrials. Due to its estimated cost of \$10 billion, the array was never built, but the project spawned many new SETI efforts, one of which was the conversion of the Big Ear.

The Big Ear radio telescope was well suited for use in SETI and was converted in 1973 for use in the search. For the first several years, the output from the receiver was recorded by multiple pen plotters. Eventually, using NASA grant money, upgrades to Big Ear included a new 50 channel receiver which was connected to the existing IBM 1130 computer, and new software (written by Jerry Ehman) designed to process the signals in a way that would enhance the telescope for SETI. Data was printed out on paper (a big improvement on the plotters previously used), and the print-outs were scanned regularly for interesting signals. It was just such a scan in which Jerry Ehman confronted what could be ET.

What makes the Wow! signal so interesting to SETI investigators is that it fits the profile of what they expect a signal from ET to be. Its frequency of approximately 1420 megahertz was in the "water hole" a quiet spot very near to that of the resonant frequency of neutral hydrogen and extending to the frequency of water. SETI researchers believe this frequency would be logical one for ET to broadcast on. The intensity and duration of the Wow! signal also matched exactly what an extraterrestrial point source would have looked like when received by Big Ear.

Obviously, confirmation of the signal is needed before it is clearly determined to be a broadcast by ET. The area of the sky in constellation of Sagittarius where the Wow! signal apparently

originated was searched again by Big Ear for several months. Other researchers using other radio telescopes have also tried to reacquire the Wow!, all to no avail. While one attempt did spend about 14 hours listening for another signal, not enough telescope time has been spent looking to either prove or discredit the Wow! signal. Maybe the timing was unlucky or the signal had since been switched off. While still unconfirmed, the so-called Wow! signal has held up as one of the most likely signals from aliens in more than 50 years of active searching.

We humans seem to have a built-in bias toward believing in extraterrestrial intelligence. For as long as mankind has given thought to the nature of our universe, there have been those who have held the belief that there are a multitude of inhabited planets "out there". Many ancient mythologies refer to other worlds in the cosmos containing non-human life forms.

As the study of the cosmos became more scientific, and the vastness of space was becoming understood, the search became more scientific. William Herschel, for example, noting the many "spiral nebulae" and thinking them to be new solar systems forming, hypothesized thousands of planets inhabited by human like beings. In fact he (and many others before and since) believed the moon to be populated with intelligent beings. Other historic figures of that period who championed a "plurality of worlds" many populated, included Immanuel Kant and Benjamin Franklin.

This belief has persisted to this day. The works of science fiction authors and movie makers have ever tapped into this belief of their audiences to make their stories believable and compelling. The late Ray Bradbury was well known for his belief that mankind's destiny is to evolve to the stars.

In my mind's eye I can still see Carl Sagan on his epic series "Cosmos" in a turtleneck sweater expounding on the "billions and billions" of planets to be found in our

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universe. On each planet, there was an opportunity for life to take hold, and for many there is the chance of evolving intelligence. NASA has funded the Kepler space observatory designed for the discovery of “earth-like” planets, as well as funding studies in astrobiology.

This belief in a “plurality of worlds” and intelligent life in the universe, however, has not been universally accepted. At times and from different quarters, it has been challenged and undermined by well-reasoned criticism. One of the most famous criticisms is called the Fermi paradox.

In the 1950s, the argument against extraterrestrial intelligence was boiled down to a simple question supposedly uttered by physicist Enrico Fermi. “Where is everybody?” The size and age of the universe and the “billions and billions” of planets out there, and the (relatively) short time it took to evolve intelligence on earth, leads us to believe that there should be large numbers of advanced civilizations out there. Since we have not yet had first contact, it means that either our current searches are incomplete, we are looking for ET using the wrong methods, or intelligent civilizations capable and interested in interstellar communication really are very rare. Carl Sagan was known to refute this by saying that the “absence of evidence does not constitute evidence of absence.”

There is also evidence from outside of astronomy that would support the Fermi paradox. Most evolutionary biologists support this criticism. They believe that there is no mechanism that would push life to evolve into the more complex forms necessary for intelligence to emerge. They point to the many places in the fossil record where life actually became less complex to bolster their case. And as to extraterrestrial intelligence, they point to what they believe is extreme improbability that intelligence evolved on earth to support their belief that we may be alone – at least in our galaxy.

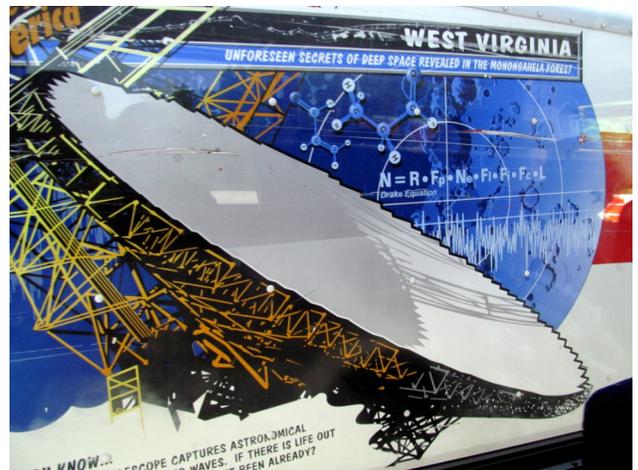
This “Rare Earth” hypothesis was put forth in 2000 by geologist and paleontologist Peter Ward and astronomer and astrobiologist Donald Brownlee in their book “Rare Earth: Why Complex Life is Uncommon in the Universe. Others have cited that cosmic events like gamma ray bursts are common and deadly enough to explain the Fermi paradox.

As much as the idea of contacting extraterrestrial civilizations really excites my imagination, I have to admit that I’m in the Rare Earth camp, though I believe that we should still keep on looking for ET and for several years ran the SETI@home program on several computers. Maybe if we all believed that intelligent life is rare in the universe we would start to act in a way to ensure we stick around and keep developing, so that if we finally do meet ET we might actually match up to them.

Was the Wow! signal really first contact? As much as we might like to believe it was, it is clear that the jury is still out. Even the experts in the field at the SETI Institute agree that the evidence is inconclusive on this

and other signals they have found.

And then again, maybe the Wow! signal was not a general broadcast signal, aimed to alert us to the existence of a new alien race. Maybe it was short targeted signal meant for a single purpose Elvis has left the building!



Editor — This is a photo of the side of a U-Haul truck taken out of our bus window on the way from Chicago to the Yerkes observatory. It shows the Green Bank dish and the Drake equation.

Just Looking

A GuideStar Article by Clayton L. Jeter



Tid-Bits....

When the weather just isn't cooperating and it seems "arm-chair" astronomy is my only cosmic pleasure, I tend to read more books, magazines, and even surf the web to learn more about our hobby. I like to record interesting astronomy facts and figures that catch my curiosity. Here are a few tantalizing tid-bits that I'm sure will raise an eyebrow or provide an audible, "Hmmm.... I didn't know that" as you read.

- Uranus had been seen in prediscovery observation on almost 20 occasions, but all those observers assumed it was just another star. The earliest known record is an observation by John Flamsteed in 1690. Uranus was officially discovered in 1781 by William Herschel.
- AAVSO has compiled 7.5 million observations of variable stars (those that change in brightness) since its founding in 1911.
- Carl Sagan's book *Cosmos*, (accompanying his Emmy and Peabody-award-winning television series of the same name) was the best-selling science book ever published in the English language.
- At the start of the 1933 Chicago world's fair, a telescope (later installed at the Yerkes Observatory) mounted there was pointed at the star Arcturus. The light from the telescope was aimed at a photocell. The photocell was connected to a small switch, which was, in turn, connected to other larger switches. When enough light from Arcturus (which had left the star 40 years before when the last world's fair was at Chicago in 1893) had gathered in the photocell, it tripped the switch that opened the 1933 world's fair.
- Harvard astronomer and co-founder of the Astronomical League, Dr. Harlow Shapley, described Leslie Peltier as "the world's greatest non-professional astronomer." Mr. Peltier secured his own place in history with the discovery of 12 comets, two novae, and 132,000 variable star observations.
- True fact: Our great comet hunter, David Levy, named his dog... are you ready? "The Beagle". Want to guess the breed?
- The Hubble Space Telescope whirls around Earth at a speed of 5 miles per second. If cars moved that fast, a coast-to-coast trip across the continental United States would take only 10 minutes.
- The James Webb Space Telescope that will replace the Hubble in 2018 is designed to look much deeper into space. The JWST will have a much larger primary mirror than Hubble (about 6 times larger in area, a total of 20 feet in diameter). The mirror is made of Beryllium which has a high strength per unit weight. It tarnishes only slightly in air. Do you think Celestron, Orion, or Meade will offer a Beryllium mirror in the future for backyard telescopes?
- The Telrad finder originated in the late 1970's when Steve Kufeld of Huntington Beach, California came up with the economical sight to help amateur (and professional) astronomers find their way across the night sky. Steve based the Telrad concept on World War II vintage bombsight technology.
- The Johnson Space Center was established in 1961 as the Manned Spacecraft Center. In 1973, the Center was re-named in honor of the late President and Texas native, Lyndon B. Johnson.
- Blooper. The 1997 movie, "Contact" starring Jodie Foster: When she first hears the alien signal at the VLA, she shouts into her walkie-talkie the Right Ascension and Declination that the signal is emanating from. Twice, she says, "Declination plus 36 degrees," but when she repeats it the third time, she accidentally says "Declination 36 hours."
- Wil Tirion is the world's foremost stellar cartographer. But years ago....Wil was a lead singer in a rock and roll band!
- In 1969, Jimmy Carter observed a UFO in the skies near Leary, Georgia. This UFO was a single luminous object about 30 degrees above the horizon that

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Browsing for Books

By Bill Pellerin, GuideStar editor

Over the years I have enjoyed browsing in bookstores to see what's new and interesting. Many years ago I was doing that and happened on the astronomy book section. I bought a book called *Discover the Stars* by Richard Berry (c. 1987), and that was it. I was hooked. This was in the Bookstop store on Shepherd at Alabama — the location soon to become a grocery store. Bookstop is gone.

I fear that such experiences are a thing of the past, and I consider it a loss. There are two reasons for this — the ability to purchase books online with fast delivery and better prices, and e-readers. I saw a book in a bookstore in Kerrville, TX a couple of weeks ago, *The Physics Book*, by Clifford Pickover. It has short articles about various physics concepts and is a nice reference book. At the bookstore the price was about \$30, from Amazon it was about \$16. I *want* to support what are now called brick-and-mortar stores, but it becomes difficult when the price differential is so high.

Physical stores provide us with products instantly, and the ability to browse the book, but at almost twice the cost? It's difficult for me to justify paying twice as much to the store. I must say that I feel a bit guilty for having discovered a book at a store and buying online but if the book had been, say, \$20 at the store I would have concluded that it was worth the extra \$4 for the convenience.

Borders Books has gone out of business and it used to be my habit to drop by on a weekly basis to look for books of interest. I bought quite a few books from the store and I believe that I compensated them sufficiently for the convenience they provided.

Electronic readers (Kindle, Nook, iPad and probably others) have done their part to drive the market to shop-at-home. E-books (content) are usually cheaper, and are provided instantly (really instantly) to your device.

It has happened already in the music market. How many CDs have you purchased recently? None? Yeah, me neither. I have LPs and CDs, but most of my music nowadays is purchased online.

The trends are obvious and the days of having the opportunity to browse a bookstore are limited. Too bad.

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Carter estimated to be about 300 to 1000 yards away. Carter and about a dozen other men watched the object for about 10 to 12 minutes as it hovered, changed course several times, and eventually disappeared in the distance. During his 1976 Presidential campaign, Carter told reporters: "It was the darndest thing I've ever seen. It was big, it was very bright, it changed colors, and it was about the size of the moon. We watched it for ten minutes, but none of us could figure out what it was. One thing's for sure, I'll never make fun of people who say they've seen unidentified objects in the sky. If I become President, I'll make every piece of information this country has about UFO sightings available to the public and the scientists."

- A telescope design to ponder:
 - Ritchey-Chrétien is coma-free, whereas the Schmidt-Cassegrain is not.



Ouch!

- Production-type Schmidt Cassegrains use a spherical primary and secondary which do not correct for coma.
- Ritchey-Chrétien has a hyperbolic primary and a hyperbolic secondary which corrects coma.
- Chrétien only has two surfaces; the Schmidt-Cassegrain has four. Therefore, Ritchey-Chrétien has less light loss.

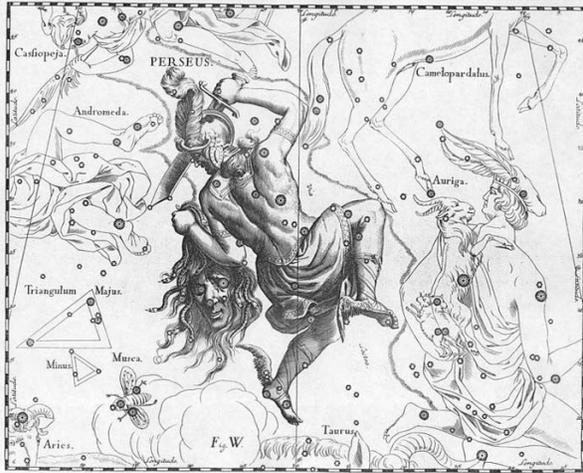
I hope you all enjoyed these tid-bits. I'll have more for you in the future. Clear skies...

Ancient Egyptians Tracked Eclipsing Binary Star Algol

By Jennifer Ouellette, *Discovery News Space*

<http://news.discovery.com/contributors/jennifer-ouellette/>

Turn your telescope to the constellation of Perseus and you might note an unusual star called Algol, dubbed the "Demon Star" or the "Raging One." You wouldn't notice anything much different at first, unless you happened to be looking during a window of a few hours -- every 2.867



Canes Venatici constellation from Uranographia by Johannes Hevelius. Source: Wikimedia Commons. Public

precisely measured the period of variability: it dims every 2.867 days.

But a new paper by researchers at the University of Helsinki, Finland, claims that the ancient Egyptians may have recorded Algol's periodic variability 3000 years ago, based on their statistical analysis of a bit of papyrus known as the Cairo Calendar.

This isn't the first time people have hypothesized that Algol's variable nature was known prior to its discovery in the 17th century. Certainly it was a familiar object, prominent in mythology and lore. In the second century, Ptolemy referred to Algol as the "Gorgon of Perseus," and associated it with death by decapitation. (In Greek mythology, the hero Perseus slays the snake-headed Gorgon, Medusa, by chopping off her head.)

Other cultures also associated the star with violence and bad fortune. It's no coincidence that H.P. Lovecraft marked the onset of his final battle in the 1919 short story, "Beyond the Wall of Sleep," with the appearance of a nova near Algol.

But the Helsinki researchers go beyond mythology and conjecture and provide a solid statistical analysis, based on historical documentation.

Goodricke proposed that Algol's periodic variability was due to an

eclipsing factor: namely, an orbiting dark body occasionally passed in front of the star, dimming its brightness temporarily.

Alternatively, he suggested that Algol itself had a darker side that turned toward the Earth every 2.687 days.

His hypothesis wouldn't be confirmed until 1881, when Edward Charles Pickering discovered that Algol is actually a binary star system: there were two stars circling together, Algol A and Algol B.

Even more intriguing: it was an "eclipsing binary," i.e., one in which the dimmer star

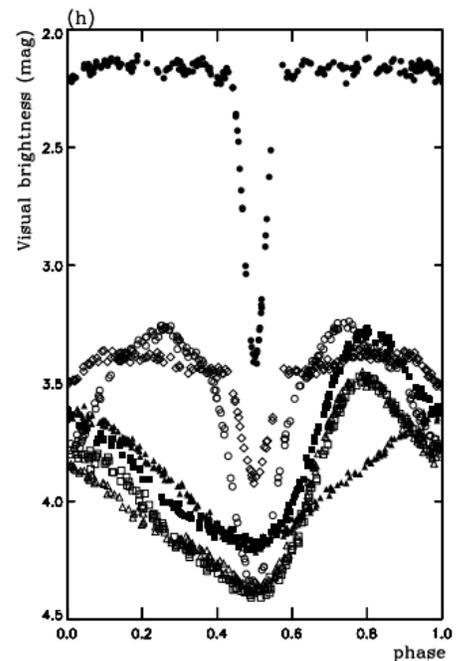


Figure from paper by L. Jetsu et al.

in the system occasionally passes in front of its brighter sibling, dimming the latter according to predictable periods. Goodricke's hypothesis was correct.

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Kids Outreach & Public Star Parties, October - December 2012

Event: Fathers & Flashlights

Type: Urban Overnight Camp for Kids & Dads. Numerous organized activities.

Date: Saturday, 10/6/2012

Time: 8:00 PM - 9:30 PM (tentative)

Location: West University Little League Field (University Blvd @ Auden Street)

Event: Camp for All / Candlelighters

Type: Observing – Kids from MD Anderson and Texas Childrens'

Date: Friday, 10/12/2012

Time: 6:00 PM – 9:00 PM

Location: Camp for All near Brenham, TX

Name: The Houston Arboretum Spring Star Party

Type: Mostly Adults – Arboretum Members. An evening at the Arboretum. Food & Drink!

Date: Saturday, 12/08/2012

Time: 7:00 PM – 9:00 PM (tentative)

Location: Houston Arboretum, 4501 Woodway Drive

Details – especially times – are subject to change

(Continued from page 11)

Actually, astronomers now know that Algol is a triple-star system, with a third star, Algol C, located a bit further out from the main pair, with a larger orbit.

All of this is necessary background for understanding the conclusions of the Helsinki scientists. The whole point of tracking the heavens so meticulously, for the Egyptians, was to make predictions about the future, dividing the calendar into "lucky" and "unlucky" days. The Cairo Calendar, while badly damaged, nonetheless contains a complete list of such days over a full year, circa 1200 B.C.

How did the Egyptians decide how to rate specific days? That's a mystery. But the Finnish team took the raw data and reassembled it into a tie series, then used statistical techniques to determine the cycles within it. There were two significant periodic cycles. One was 29.6 days, very close to current estimates of a lunar month (29.53059 days).

The second periodic cycle was 2.85 days. Lead author Lauri Jetsu and her colleagues argue that this corresponds to Argol's variable period. It's suspiciously close to the 2.867 period Goodricke measured back in 1783.

Close, yes, but it's not a precise match, which is problematic. The Egyptians weren't known to be sloppy in their astronomical calculations. They should have been able to pinpoint a value much closer to Goodricke's -- unless, say, Algol's period changes over time.

There is some evidence that this might be the case, possibly due to the presence of the third star in the Algol system. Calculating the behavior of a two-body system is one thing; grappling with the dreaded "three-body problem" is quite another, particularly since astronomers are only working with roughly 300 years of data. Algol looks like it's living up to its "Demon Star" moniker.

That's where Jetsu *et al's* paper might prove to be more than just an intriguing historical oddity. It provides some missing data from 3000 years ago, which could help astronomers further constrain their models for Algol's variable behavior.

This content distributed by the

AAVSO Writer's Bureau

Shallow Sky Object of the Month

Corona Australis

Object: Corona Australis**Class:** Constellation**Constellation:** Corona Australis**Magnitude:** 4.1 (brightest star) — all the stars that comprise the crown are between 4th and 5th magnitude**R.A.:** 18 h 34 m 24 s**Dec:** -41 deg 29 min 24 sec**Size/Spectral:** 128 degs². 80th in size.**Distance:** 6500 ly**Optics needed:** Binoculars to see the constellation, a small telescope for the double stars and a larger telescope for the nebula***Why this is interesting:***

Anytime that the teapot (asterism) in Sagittarius is visible we point our telescopes at all of the famous objects in and around the area. These objects are a telescope magnet, attracting unwary observers to them like a fly to honey.

I remember a night in the Texas Hill Country with only my binoculars at hand standing at the top of a hill and wondering what I could observe that would be new to me. My pocket sky guide had very little detail, but my eye was drawn to a constellation I had never observed before — Corona Australis, the southern crown.

We're familiar with Corona Borealis, the northern crown but much less familiar with its southern cousin.

The southernmost star in the crown is 17.3 degrees above the horizon and the northernmost star in the crown is about 22.25 degrees above the horizon at midmonth at 30 degrees north latitude.

If you want to see some objects you've never seen before, this is the place to be. I'd venture a guess that you have never looked for and found this constellation before. I found it easy to pick out in the dark Hill Country skies.

Once you've found the constellation, what else is there to look for? Plenty as it turns out.

NGC6723 is a bright globular cluster just off the north edge of the crown (it actually sits in the constellation Sagittarius). Can you see it in binoculars on a dark night?

Just southeast of 6723 by the width of the moon (1/2 degree) is NGC6726/6727 and two young stars just joining, or just about to

Finder charts for the objects in this article are on the next page

join the main sequence. This is a star forming region only 430 light years away

Twelve arc minutes southwest of this is IC4812. If you are working on the Caldwell list, don't miss the globular C78 (NGC6541) at the southwest corner of the constellation boundary, about 12 degrees away from the crown.

Gamma (γ) Australis is a tight double star. The separation of the two components is a close 1.6" but the stars are both 5th magnitude and it's easier to separate stars of equal magnitude than ones of unequal magnitude. You'll need high magnification for this one so get out your short focal length eyepieces. For comparison, the two stars that make up Epsilon Lyr's ϵ^1 (the northern star pair in the famous double-double) star are 2.6 arc seconds apart, so this one is tighter than that.

An easier double is Kappa (κ) Cra at 21.4" separation. This is a visual magnitude 6.3 star so it'll be a bit more challenging to find.

Variables—

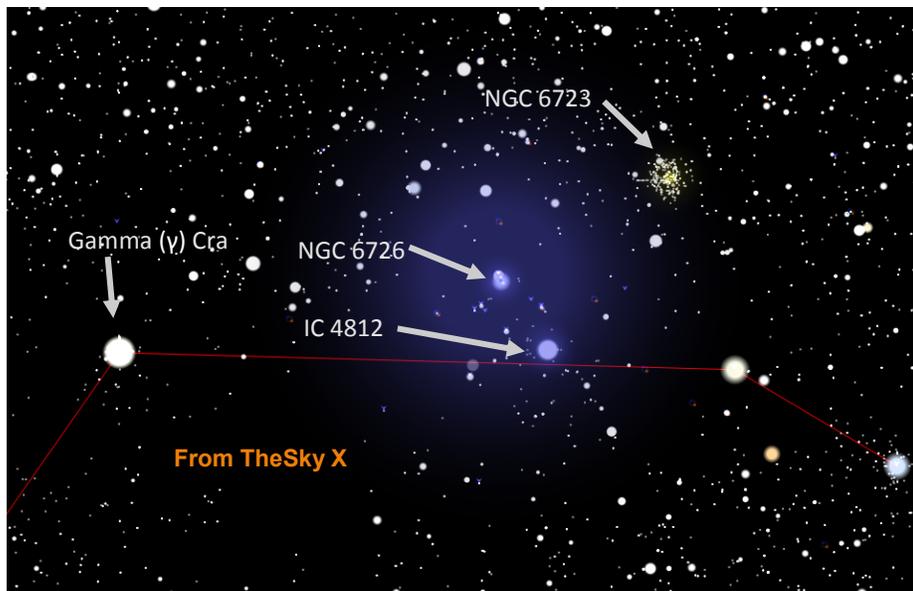
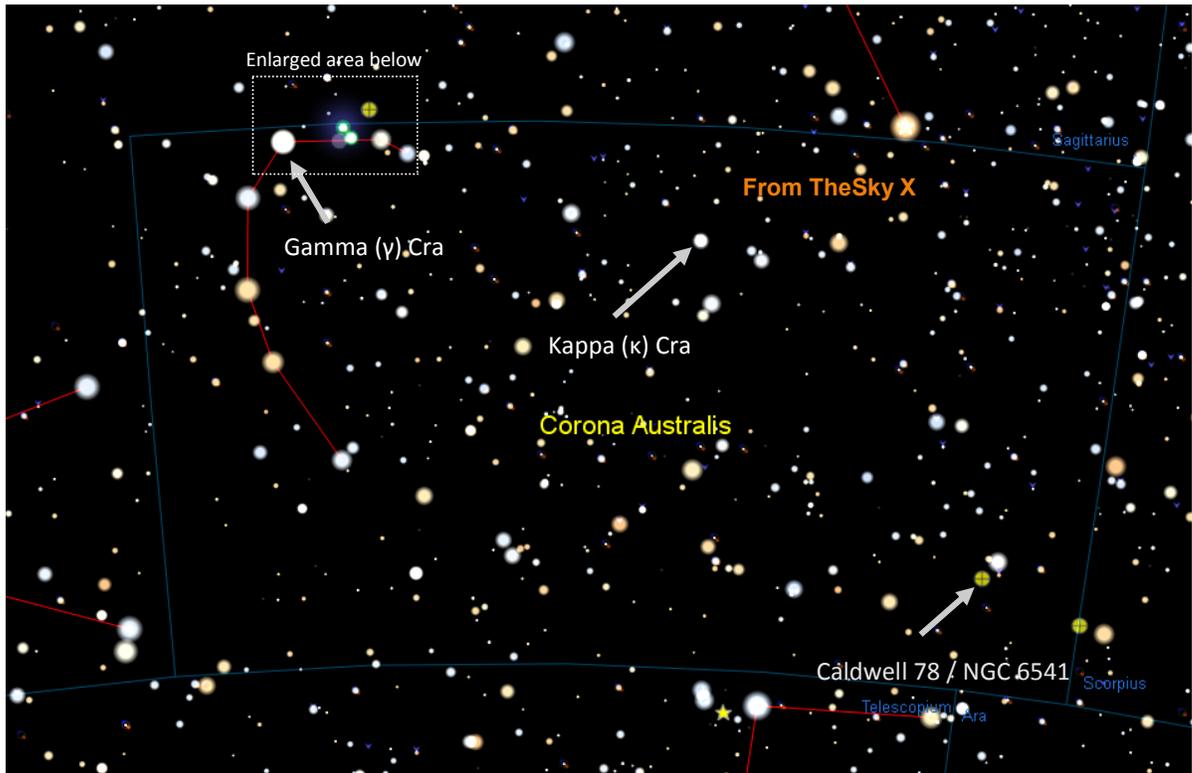
ϵ CrA — an eclipsing binary 4.7-5.0m, Appx 14 hour period

R CrA — Pre-main sequence Herbig-Haro star 9.7-13.9m

S CrA — T Tauri star—a low mass pre-main sequence star

TY CrA — 8.7-12.4m — surrounding nebulosity brightens and dims with star

Finder Charts for Objects in Corona Australis



(Left) Detail from chart above (boxed area)

Houston Astronomical Society

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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.

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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, August 3, 2012

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 (by the stadium)
- 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 (by the stadium)
- Science and Research is across the street (2nd building back)

Parking:

There is Free Parking, **BUT DO NOT PARK IN ANY RESERVED PARKING SPACES AT ANY TIME.**

U of H parking enforcement will ticket your vehicle.

UPDATE — Due to construction in the stadium parking lot, use entrances 15D and 15F. You can park in this area, but NOT in a RESERVED space.