SKYSCRAPERS INC.

the Skyscraper

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August 2013

AMATEUR ASTRONOMICAL SOCIETY OF RHODE ISLAND ⋆ 47 PEEPTOAD ROAD ⋆ NORTH SCITUATE, RHODE ISLAND 02857 ⋆ WWW.THESKYSCRAPERS.ORG

Saturday, August 3
at Seagrave Memorial Observatory

In this issue

Finding Longitude by Observing the Moon
by Frank Reed

Mr. Frank Reed of Reed Navigation, Jamestown RI, will describe the famous method of finding longitude by lunar distances, usually known for short as "lunars". Lunars were widely used at sea in the early 19th century in the era before chronometers became inexpensive and common. By observing the position of the moon relative to the sun or stars, navigators used the moon as a great natural clock in the sky. The method of measuring lunar distances was championed by the Astronomer Royal in the 18th century as the Astronomical substitute to using chronometers. It was the belief at Greenwich that no mere mechanical contrivance could solve the most challenging practical Astronomy problem of the day. Thus the measurement of lunars competed against Mr. Harrison's famed chronometers for King Charles' prize.

Frank Reed earned his BA in Physics from Wesleyan in 1984. He teaches various navigation courses and has developed the Centennia Historical Atlas. He has been the guest of Neil deGrasse Tyson's StarTalkRadio.

A Unique 1960's Catadioptric Telescope in the Trewongy Planetarium Collection by Jeff Dunn

Mr. Jeff Dunn is the supervisor of the Trewogry Planetarium at Mystic Seaport . While giving a tour of the back room of the Mystic Seaport Planetarium to Steve Siok, he opened the box containing a catadioptric telescope. Short tube, corrector plate and an 8" primary mirror. But the resemblance to a garden variety Meade or Celestron ends there. Please join us as Jeff describes this strange and expensive instrument. He will also describe the mission of the Trewogry Planetarium at the Seaport.

Jeff received his B.S. in elementary education from Kutztown University in Pennsylvania and M.A. in geography and remote satellite sensing from West Virginia University. He pursued a PhD in geography at the University of Connecticut.

President's Message

Ed Haskell

For more than sixty years the Society has sponsored **AstroAssembly**, our annual technical and social event held near the First of October. Attendance typically varies between seventy five and one hundred twenty five. The majority of attendees are from the northeastern states and are not members of Skyscrapers. While we are happy to provide a stage for any good presentation it is true that most of the talks are given by professionals in one of the scientific or engineering disciplines. The programs are well received by those in attendance and frequently follow a theme for the meeting.

It is probable that the quality of the agenda is what attracts first time attendees, but it is clear that repeat attendees return for another reason as well. Many people return to renew friendships that have formed over the years between those who never have an opportunity at any other time to see each other. Recognizing this important "feature" of the meetings we intentionally make sure there is adequate time for socialization.

The report on the 2012 AstroAssembly may be found at http://www.theskyscrapers.org/astroassembly-2012 and gives a good idea of what the event is like. While we expect presentations given by professionals to be … well, professional, this report makes clear that talks by members can be every bit as polished and interesting. If you haven't been to an AstroAssembly then you have missed a really fine time.

AstroAssembly requires a good deal of effort to put on each year. All of that effort is provided by volunteers, nearly all of whom are Skyscrapers members. Sadly most members of Skyscrapers do not attend. There are at least two reasons why that is sad: those who do not attend miss a very good experience, and not attending reduces the Society's income. AstroAssembly is one of the larger contributors to the annual operating budget of the Society. Without that income, dues for a Regular Membership would have to increase by more than fifteen percent. So when a Member attends AstroAssembly not only is a good time had but the Society's economic situation is made better. For these reasons if none other I hope you will make attendance this year a high priority. You won't regret it, and you may make some new friends.

Thanks for all you do for Skyscrapers.

AstroAssembly 2013

October 4th & 5th

Registration on page 11

The Skyscraper is published monthly by Skyscrapers, Inc. Meetings are held monthly, usually on the first or second Friday or Saturday of the month. Seagrave Memorial Observatory is open every Saturday night, weather permitting.

Directions
Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

Submissions
Submissions to The Skyscraper are always welcome. Please submit items for the newsletter no later than **August 23** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

E-mail subscriptions
To receive The Skyscraper by e-mail, send e-mail with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal mail.

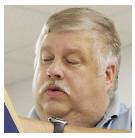
Members Observing Night: August 30

Pat Landers

Please join me on Friday, August 30th, at 8:00 p.m. for a Members Observing Night. Perhaps my fondest Skyscrapers' memories are from the mid 1990s when we often observed as a group after monthly meetings. This would just be for us. Evenings such as this are a wonderful way to learn new telescopic targets, try each other's scopes and eyepieces, and most of all enjoy our camaraderie and shared passion.

For a late August evening, I suggest we explore the Summer Milky Way and its many great objects, Messier and otherwise. I encourage you to bring your scopes and binoculars, whether big or small. The emphasis is on fun.

If you can't make it on the 30th, have no fear--I'm hoping to host several of these events going forward. Hope to see you there!!



SEAGRAVE OBSERVATORY CENTENNIAL

Last Call for Photos

Dave Huestis

Skyscrapers members,

In the April Skyscraper I posted a call for images of Seagrave Observatory taken by our members during the 50's to 70's. And later if you have something good.

No one responded.

This is a last call to possibly have your image(s) selected to help celebrate the Seagrave Memorial Observatory Centennial in 2014.

Here is a revised call for images.

In 2014 we will be celebrating the Centennial anniversary of our observatory in North Scituate. Frank Seagrave moved his 8-inch Clark refractor to the once dark skies on Peeptoad Road in 1914 from his old observatory on Benefit Street in Providence to escape the gas lamps and coal dust that were affecting his observations.

A committee has been formed, and we will be exploring ways to commemorate this special event.

Without going into the details (we want there to be some pleasant surprises), I am asking our long time members to search through their picture and slide archives looking for images that show Seagrave Memorial Observatory throughout the decades. I am particularly interested in images from the 50's through the 70's. Whatever format you have, please have them scanned at a high resolution (at least 2400 dpi for slides and black and white negatives and 300 dpi for prints) and saved as uncompressed tiff or jpeg formats. We need raw images. Do not tweak them in any way.

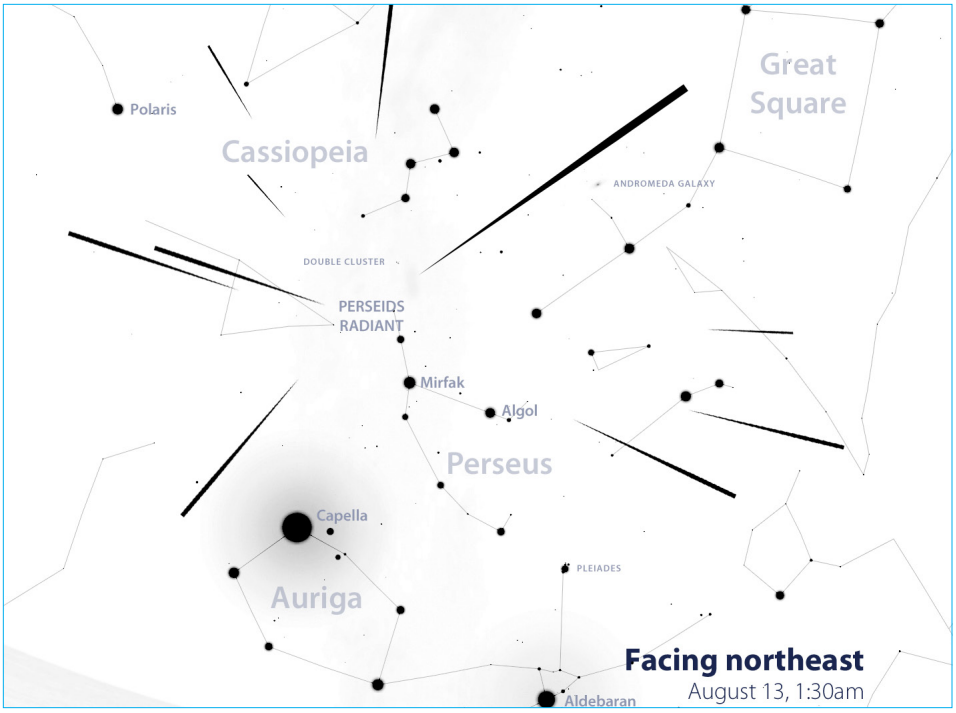
When submitting your image(s) please provide as much detail as possible, including date, etc.

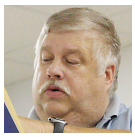
By submitting you are also giving Skyscrapers permission to reproduce your image(s), giving you full credit, in whatever media we choose to help illustrate the history of the observatory.

The new deadline is August 16. However, please don't wait until that date to submit your image(s). Please submit when you find one or two. Don't hold them and submit all at once. Depending upon the resolution of your scan, we may have to ask to borrow your original to have it professionally scanned at a higher resolution.

You may submit your images by email to me at: dhuestis@aol.com

Help us as we prepare to celebrate the Centennial anniversary of Seagrave Memorial Observatory.





Perfect Prospects for Perennial Perseids

Dave Huestis

Traditionally the August Perseid meteor shower is one of the best shooting star displays of the year. However, here in southern New England we haven't observed a decent performance by this annual shower for I don't know how long. While a bright Moon can severely limit the number of meteors seen regardless of location, weather conditions seem to conspire to prevent local sky enthusiasts from enjoying this celestial sky show.

It still amazes me that many folks are uninformed about the nature of meteor showers. More than 210 years ago scientists believed the appearance of meteors streaking across the sky was an atmospheric phenomenon. Rocks couldn't fall from the sky! However, in 1803 France, a huge fall of about 3,000 "thunder stones" was witnessed by many citizens in broad daylight. Presented with overwhelming evidence, scientists finally accepted that meteorites were of extraterrestrial origin.

Today we know that most meteors are particles stripped off of comets and deposited in orbit about the Sun. When the Earth passes through these streams of cometary debris, the meteors plunge into our atmosphere at many miles per second and disintegrate. Those events are called meteor showers. Most of the particles are no bigger than a thumbnail.

Some solitary and denser meteors are small asteroids or fragments of them. That scenario was the case of the Russian meteor on February 15 of this year. A 56-66 foot sized stony asteroid weighing an estimated 22,050,000 pounds plunged through the atmosphere over Chelyabinsk and exploded perhaps 15 miles high in the sky. The concussion wave damaged buildings and showered observers with glass when they went to the windows to see what was happening. While most of the object was obliterated in the blast, some small fragments were recovered from the ground. An event of this magnitude is uncommon.

Consequently, there is no safety concern if you decide to watch the Perseid meteor shower. The material shed by Comet 109P/Swift-Tuttle is completely annihilated in our upper atmosphere when the Earth passes through the debris. Anyway, even if a small mass survived the plunge, you'd have a better chance of winning Powerball than being struck by a meteorite!

For us in the eastern United States, the Earth's passage through the densest portion of the meteor stream occurs during daylight hours (3:00 pm) on August 12. Therefore, I would recommend observing on the night of August 11-12, preferably after midnight when the Earth plows into the particles nearly head-on. I would also observe the following night as well, waiting until the midnight hour.

While you might not observe 60+ shooting stars per hour due to this issue of timing, a waxing crescent Moon will set between 10:00 pm and 10:30 pm during the two evenings noted above. These combined circumstances will still provide an observer with the best conditions possible for the Perseids this year. All you will have to do is to find a viewing location that is as far removed from light pollution as possible to enhance further your observing experience.

The Perseids blaze across the heavens at 134,222 miles per hour and are usually green, red or orange in color. Some members of this shower are bright and often produce exploding fireballs. While you can scan for shooting stars across the entire sky, the members of this shower appear to radiate from an area of sky, called the radiant point, in the constellation of Perseus.

Perseus is well up in the northeast sky after midnight. (See accompanying finder chart.) If you can locate the constellation of Cassiopeia, which looks like an "M" or "W" tipped sideways, then you are close enough. Face in this general direction when you first begin your observing session and gradually follow the radiant across the sky. As Perseus rises higher into the sky, the number of meteors will increase as the morning progresses.

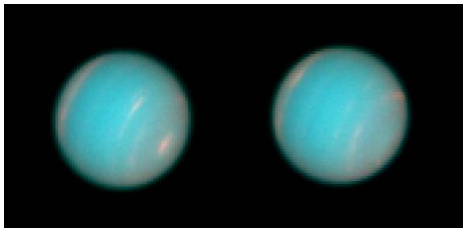
While you do not need a telescope to observe a meteor shower, the local observatories provide great views of far more distant astronomical splendors within our galaxy and beyond. Seagrave Memorial Observatory (http:/www.theskyscrapers.org) in North Scituate is open every clear Saturday night. Ladd Observatory (http://www.brown.edu/Departments/Physics/Ladd/) in Providence is open every clear Tuesday night. Frosty Drew Observatory (http://www.frostydrew.org/) in Charlestown's Ninigret Park is open every clear Friday night. Be sure to check all the websites for the schedules and opening times before visiting these facilities.

And finally, if you were wondering what that very bright object was in the western sky after sunset the last few weeks, it was our closest planetary neighbor Venus. You can't miss it, but if you want to be sure, a waxing crescent Moon will pass close to it on August 8 and 9.

Keep your eyes to the skies and hopefully you'll see more shooting stars than fireflies.

Observing Neptune in 2013

Jim Hendrickson



Neptune images by Hubble Space Telescope WFPC2. NASA/JPL/STScI

Our solar system's eighth and outermost planet Neptune reaches opposition on August 27, meaning that it is at its nearest position to us and therefore this is the best time of the year to observe it. Technically speaking, an opposition is when Earth comes into line between the Sun and an outer planet rather than the other way around since Earth orbits faster than any of the outer planets.

For the past several years, Skyscrapers has been offering views of the ice giants Uranus and Neptune during our weekly Saturday night observing programs because most people rarely see these faraway yet fascinating worlds. While not visible to the naked eye, they are easily seen in the smallest of telescopes and even binoculars if you know where to look. Included with this article is a sky map showing the position of Neptune each week on Saturday night.

Throughout late summer and autumn of 2013 Neptune is situated within the triangle formed by Ancha (theta Aqr) to the north, sigma to the east and 38 Aqr to the west. This triangle can be found eight degrees south of the "water jar" asterism of Aquarius.

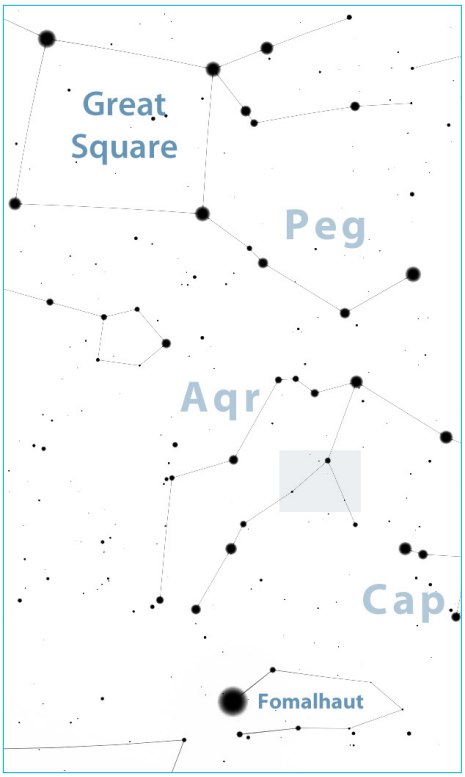
Sunlight reflected from Neptune is absorbed by methane in the planet's upper atmosphere, giving it a distinct bluish hue that appears as an 8th magnitude "star" among the background stars of Aquarius throughout 2013. Although Neptune's 49,100 kilometer diameter is almost four times larger than Earth's, the outer ice giant exhibits an apparent diameter of only 2.3 arcseconds at its closest distance of 28.97 astronomical units (4.33 billion kilometers). Due to this fact, Neptune does not present much in the way of detail from Earth-bound observers.

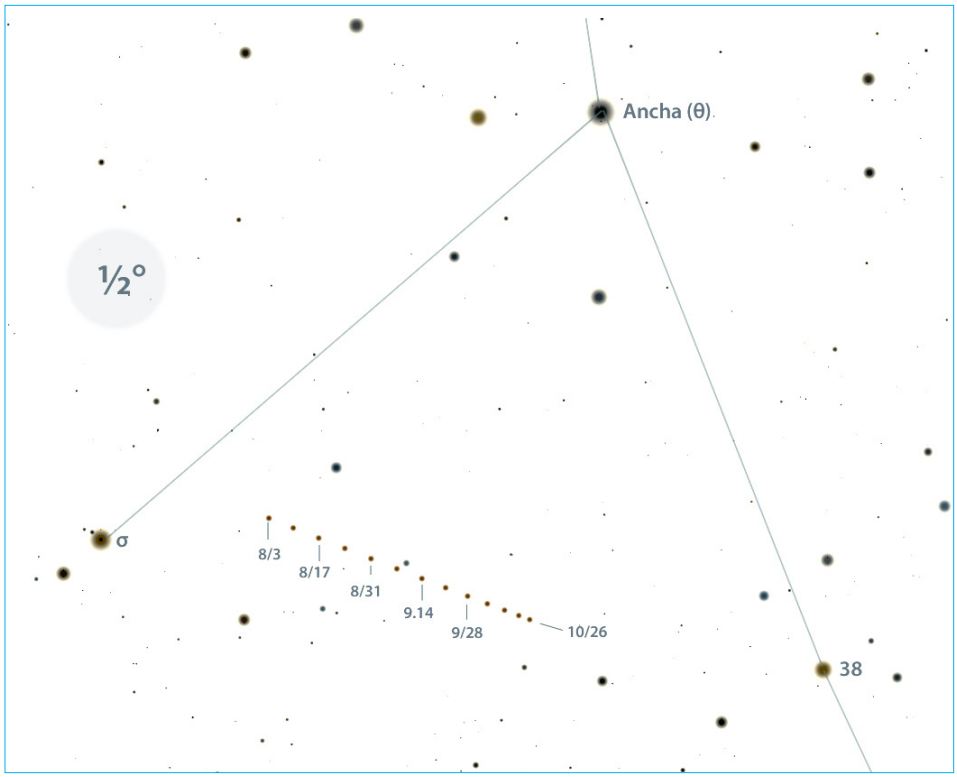
While you cannot expect to see much more than a tiny blue sphere while observing Neptune, you may be challenged to try to spot its largest moon Triton, shining at magnitude 13.5. Triton was discovered in 1846 (the same year as Neptune) and is the 7th largest moon in the solar system. A skilled observer using a 12-inch or larger telescope under optimal sky conditions should be able to spot Triton orbiting within 18 arcseconds of Neptune. If you do not have access to a large telescope but do have some experience in astro-imaging, you may try to detect Triton with your camera. The trick is to use a long focal length to separate Neptune and Triton as much as the steadiness of your tracking mount will allow. Triton's orbit is inclined such that it will appear at least 10 arcseconds from the planet throughout its 5.88 day orbit. There is a reference diagram on page F50 of *The Astronomical Almanac* or you can use *Sky & Telescope's* Triton Tracker (http://www.skyandtelescope.com/observing/objects/javascript/triton_tracker/) to find it's current position.

Neptune gets a visit from Comet 154P/Brewington during the second week of September. The comet passes within 30 arcminutes of Neptune on the 12th, during which time the comet is expected to be as bright as 12th magnitude, but you will probably want to wait until the Moon sets around midnight before trying to spot it.

Neptune was in the news recently for its newly discovered fourteenth moon. This small moon is estimated to be about 20 kilometers wide and orbits Neptune at a distance of 105,000 kilometers, giving it an orbital period of 23 hours, placing it well inside the orbit of Triton.

Good luck in your hunt for Neptune. Next month we will find Uranus.





Planetary Nebula in Cygnus

NGC 6826: The Blinking Planetary

Glenn Chaple

Backyard astronomers are familiar with the tactic of using averted vision to capture faint detail in deep-sky objects. A sideward glance allows photons to fall on the light-sensitive region of the retina, rendering the invisible visible. The effect of averted vision is particularly dramatic when the telescopic target is NGC 6826.

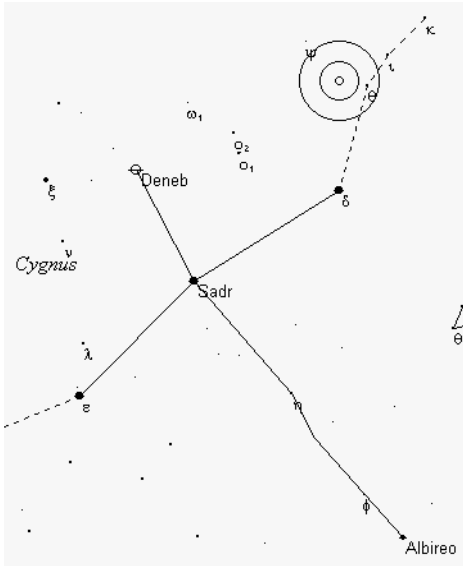
This 9th magnitude, 25 arcsecond-wide planetary nebula is dominated by a magnitude 10.6 central star. Gaze directly at NGC 6826, and all you see is the central star. Look to the side, however, and a bluish shell surrounding the star pops into view. Return your gaze to the central star, and the nebula disappears. Here is a deep sky object that does something!

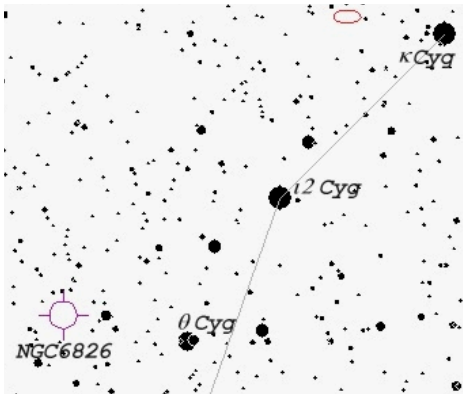
This remarkable planetary nebula was discovered by William Herschel in 1783. The first documented description of the blinking effect seems to have come from James Mullaney, who described the phenomenon in the August, 1963, issue of Sky and Telescope and coined the nick-name "Blinking Planetary."

Although NGC 6826 is visible in a modest 2.4-inch refractor, the blink effect is best-seen with medium-aperture scopes. Last September, I viewed NGC 6826 with 4-inch and 10-inch reflectors and noted: "Located near a pretty double star (16 Cyg). Unable to detect "blinking" illusion with the 4-inch. With a 10-inch Dob and 6mm eyepiece (208X), blinking effect obvious but not immediate unless I stared at the nebula for several seconds. When I did, the nebulosity faded until just the central star was visible. A quick sideward glance and "voila," the nebula reappeared."

16 Cygni, located just one-half degree west of NGC 6826, is a striking twin system consisting of magnitude 6.0 and 6.1 G-type stars separated by 39 arcseconds. Double star and planetary nebula can be captured together in a low-power field. Don't go too low, however. With magnifications of 25X or less, NGC 6826 appears starlike and may elude detection.

As telescope size increases, the blinking affect lessens because a large-aperture instrument begins to reveal nebulosity even when NGC 6826 is viewed head-on. If your scope is too big to make NGC 6826 blink, try your luck with its FLIERs. In her book *Deep-sky Wonders*, author Sue French invites users of medium- to large-aperture telescopes to look for a tiny bright patch at each end of the planetary's long axis. Each is a so-called FLIER (Fast Low-Ionization Emission Region) – an enigmatic feature possibly caused by the interaction of material being ejected by the central star with gases already in the shell.





Finder charts and image of NGC 6826 and 16 Cygni. In all graphics, north is up. Finder charts from utahskies.org, astrosurf.com. Photo by Michael Siniscalchi (helixgate.net)

6

Light

Mark Sweberg

Light is awesome. It's something we take for granted every day; we certainly don't stop and think about it often or try and define it. Let's give light its due and take a few minutes to understand some things about it.

Simply stated, light is nature's way of transferring energy through space. Light acts like a wave, yet has particle-like properties too. Light can be thought of as familiar ocean waves. Think about this for a second. Ocean waves are disturbances, ripples on the water, and they possess a certain height (amplitude), with a certain number of waves rushing past you every minute (the frequency). They all move at a characteristic speed across the water (the wave speed). Notice the distance between successive waves? That's called the wavelength.

Now, envision the ocean wave as a wave of light hurtling through space. The wave speed of a light wave is simply the speed of light. Coolly, different wavelengths of light appear as different colors! Physicists classify light waves by their energies (wavelengths). Labeled in increasing energy, we can draw the entire electromagnetic spectrum as shown in the figure below:

When we look at the Universe in a different "light", i.e. at "non-visible" wavelengths, we probe different kinds of physical conditions -- and we can see new kinds of objects!

Too, we can think of light in terms of its wave speed (the speed at which it travels through space.) Light travels at 186,000 miles a second (its wave speed.) In one hour, it travels 660 million miles. In one year, it covers about 6 trillion miles. The distance it travels in a year is referred to as our familiar light year. Think of a light year as a measure of distance (6 trillion miles), not of time (one year.)

Contrast this to a snail's pace which has been measured at speeds of 1,600 feet per hour. At that pace, in a year, it would travel 263 miles. The fastest animal on earth, a cheetah, can run about 70 miles an hour. In a year it would travel 613,000 miles, if it were inspired to. I can walk 4 miles in an hour. If I kept that up for a year, I would cover 35,000 miles, over 4 times around the earth.

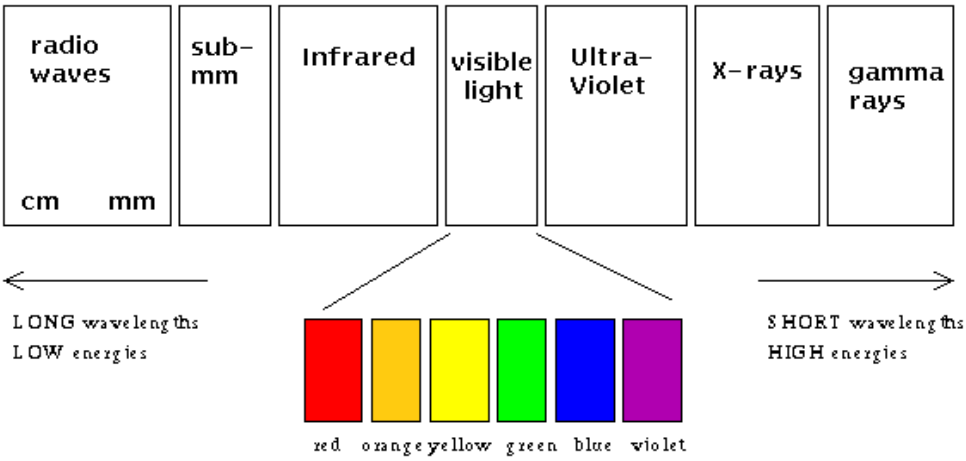
When we consider the vastness of space, the mind becomes overwhelmed. Measured in light years, the closest star to us after our sun, Proxima Centauri, is 4.22 light years away. The nearest galaxy, the Canis Major Dwarf Galaxy is 25,000 light years from the Sun. The furthest galaxies we have been able to find to date are 13 billion light years away from us. And, don't forget; multiply these figures by 6 trillion and you'll get the truly unfathomable distances contained in the Universe.

Looking out at the nighttime sky is akin to looking back into time. The objects are so far away in terms of miles that light coming from them literally takes tens of thousands of years, and more, to reach us. Light from an object 10,000 light years away was first emitted from that object 10,000 years ago and is just now reaching us. That object may not, in fact, exist anymore!

In the time it took me to write this in my home study at night by a window, the light from the glow of my computer screen would have traveled 1,320,000,000 miles.

I'll wrap up with that thought and walk to the kitchen about 10 feet away and enjoy a bedtime snack! But first, I'll turn on the light.

Your comments on this column are welcome. E-mail me at mark.sweberg@gmail.com



What do you see when you look at the Moon?

Francine Jackson

Quick! Look at the Moon! What do you see?

Have you ever looked at the Moon, especially during the waxing and waning gibbous phases, and seen some type of shape? Normally, we speak about the Man on the Moon, but there are a lot of other images that people see; all you need is your imagination.

The typical shape is the Man, visible with his two eyes, a simulated nose, and a mouth looking like the "Oh, no!" of Mr. Bill. However, because of the beautiful myth of the rabbit, there's the very easy set of rabbit ears passing over the top of the surface; and yet, at a recent conference, one of the presenters saw the bunny shape directly opposite, where the "ears" have now become his back legs.

And, what about the Ant? Using the traditional bunny, his ears now become insect antennae - or, maybe crab claws. And, now I've heard of a Gibson girl, complete with bun, or, maybe a woman reading a book.

Quick! What do you see?

Full Moon image by John Kocur

JULY REPORTS

Secretary

Tom Thibault

Board of Directors Meeting Minutes – July 22, 2013

Attendees: Ed Haskell, Bob Horton, Kathy Siok, Linda Bergemann, Tom Thibault, Steve Siok, Jim Crawford, Ernie Ross, Pat Landers, Dave Huestis and Jim Hendrickson

Meeting called to order at 7:05PM at Seagrave.

Ed Haskell, President: Two pending Awards will be presented during the AstroAssembly Banquet.

Fee structure for AstroAssembly will remain at last year's rates.

BOD Meetings will occur the Monday closest to and prior to the 15th of each month.

Work continues in determining Comet ISON activities and possible viewing locations. Dave Huestis has submitted a request to the State for possibly utilizing Beavertail State Park at Jamestown, RI.

Kathy Siok, 1st Vice President: September Meeting will occur on Friday, the 6th, speaker has yet to be determined.

A speaker for the November Meeting has been confirmed.

Bob Horton, 2nd Vice President: A full line-up of AstroAssembly presenter has been confirmed, there are some openings available for the Friday evening and members are encouraged to contact Bob if they would like to provide a short presentation.

Bob will submit the $5.00 Fee to the State Police and arrange for the large tent rental required for our AstroAssembly event

Kathy Siok has provided a listing of all functions requiring volunteer assistance and will work with Bob to fill these slots.

Ed Haskell will provide a loaner small tent and Jim Crawford has volunteered to complete a thorough cleaning of the meeting hall.

Bob will investigate with the assistance of Linda Bergemann a replacement unit for the digital projector.

Dave Huestis, Historian: Had some archive photographs developed for the Seagrave Centennial Calendars and will be submitting invoicing to be reimbursed.

Trustees: Steve Siok noted communication issue have arisen regarding remote

Greg Tucker

Treasurer

Linda Bergemann

Cash Flow YTD July 17, 2013
4/1/2013 through 3/31/2014

INFLOWS	
Donation	
Misc Donation	$132.00
Refreshment Donation	$130.20
Starparty Donations	$74.00
TOTAL Donation	**$336.20**
Dues	
Contributing	$134.05
Family	$240.00
Regular	$790.00
Senior	$275.00
TOTAL Dues	**$1,439.05**
Subscription Income	
Astronomy	$290.00
Sky & Telescope	$197.70
TOTAL Subscription Income	**$487.70**
TOTAL INFLOWS	**$2,262.95**
OUTFLOWS	
Facilities Expense	
Electric	$57.57
Propane	$80.25
Property Maintenance Fund	$198.00
Trustee Exp	$264.09
TOTAL Facilities Expense	**$599.91**
Misc Expenses	
Corporation, State Fee	$30.00
Postage and Delivery	$9.20
Refreshment Expense	$49.36
TOTAL Misc Expenses	**$88.56**
Subscription Payments	
Astronomy	$290.00
Sky & Telescope	$197.70
TOTAL Subscription Payments	**$487.70**
TOTAL OUTFLOWS	**$1,176.17**
OVERALL TOTAL	**$1,086.78**

Cash and Bank Accounts - As of 7/17/2013

Capital One Bank	$12,310.71
Checking	$11,848.17
PayPal Account	$0.00
TOTAL Bank Accounts	$24,158.88
OVERALL TOTAL	**$24,158.88**

operation of the 16" Meade and solutions are being reviewed.

Jim Crawford has provided a contact for an Upgrade Solution for the Meade and will follow-up with the group.

Membership demonstration will be delayed until issues are resolved.

Motorized roof system has been received and installation will be scheduled.

Lawn tractor tires (2) have been replaced and it is back in operation.

A work session will be scheduled for removal of dead pine trees along entry road with abutting neighbor.

Trustees will be reviewing options regarding the removal and replacement of the ceiling tiles within the meeting hall.

Efforts will continue in regards to determining the sale of surplus telescope equipment.

Meeting adjoined at 8:35PM

Submitted by Tom Thibault - Secretary

Phases of the Moon

New Moon
August 6 21:51

First Quarter Moon
August 14 10:56

Full Apollo Moon
August 21 01:45

Last Quarter Moon
August 28 09:35

Inventing Astrophotography: Capturing Light Over Time

By Dr. Ethan Siegel

We know that it's a vast Universe out there, with our Milky Way representing just one drop in a cosmic ocean filled with hundreds of billions of galaxies. Yet if you've ever looked through a telescope with your own eyes, unless that telescope was many feet in diameter, you've probably never seen a galaxy's spiral structure for yourself. In fact, the very closest large galaxy to us–Andromeda, M31–wasn't discovered to be a spiral until 1888, despite being clearly visible to the naked eye! This crucial discovery wasn't made at one of the world's great observatories, with a world-class telescope, or even by a professional astronomer; it was made by a humble amateur to whom we all owe a great scientific debt.

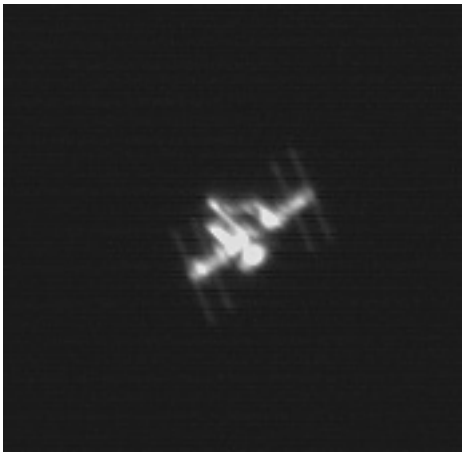
Great Nebula in Andromeda, the first-ever photograph of another galaxy. Image credit: Isaac Roberts, taken December 29, 1888, published in A Selection of Photographs of Stars, Star-clusters and Nebulae, Volume II, The Universal Press, London, 1899.

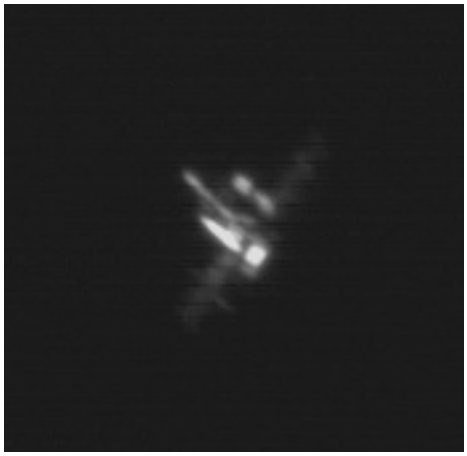
Beginning in 1845, with the unveiling of Lord Rosse's 6-foot (1.8 m) aperture telescope, several of the nebulae catalogued by Messier, Herschel and others were discovered to contain an internal spiral structure. The extreme light-gathering power afforded by this new telescope allowed us, for the first time, to see these hitherto undiscovered cosmic constructions. But there was another possible path to such a discovery: rather than collecting vast amounts of light through a giant aperture, you could collect it over time, through the newly developed technology of photography. During the latter half of the 19th Century, the application of photography to astronomy allowed us to better understand the Sun's corona, the spectra of stars, and to discover stellar and nebulous features too faint to be seen with the human eye.

Working initially with a 7-inch refractor that was later upgraded to a 20-inch reflector, amateur astronomer Isaac Roberts pioneered a number of astrophotography techniques in the early 1880s, including "piggybacking," where his camera/lens system was attached to a larger, equatorially-mounted guide scope, allowing for longer exposure times than ever before. By mounting photographic plates directly at the reflector's prime focus, he was able to completely avoid the light-loss inherent with secondary mirrors. His first photographs were displayed in 1886, showing vast extensions to the known reaches of nebulosity in the Pleiades star cluster and the Orion Nebula.

But his greatest achievement was this 1888 photograph of the Great Nebula in Andromeda, which we now know to be the first-ever photograph of another galaxy, and the first spiral ever discovered that was oriented closer to edge-on (as opposed to face-on) with respect to us. Over a century later, Andromeda looks practically identical, a testament to the tremendous scales involved when considering galaxies. If you can photograph it, you'll see for yourself!

Astrophotography has come a long way, as apparent in the Space Place collection of NASA stars and galaxies posters at http://spaceplace.nasa.gov/posters/#stars.





Bob Horton captured these images of the International Space Station on the morning of June 21 using his home-built 12" telescope and a Luminera camera. Even though the chip is smaller than the Nikon DSLR, he did not have that much difficulty aiming the telescope. The images are slightly overexposed at 6ms,

URI Planetarium Schedule

The planetarium is located on Upper College Road and is operated by Skyscrapers member and Frosty Drew Observatory director Francine Jackson. The planetarium offers programs for the public on the second Saturday of each month. Upcoming shows include:

August 9: Seven Wonders
September 13: Cosmic Colors
October 11
November 8
December 13

Skyscrapers, Inc. presents

AstroAssembly 2013

Automated Observatories & Remote Astronomy

October 4th & 5th

47 Peeptoad Road
North Scituate, Rhode Island
www.theSkyscrapers.org/AstroAssembly2013

Friday Evening Informal Talks & Stargazing

At Seagrave Memorial Observatory

Talks begin at 7pm. Anyone wishing to give an informal talk (15 minutes or less) on Friday night, October 4th should contact Bob Horton at Robert_Horton@brown.edu.

Pomfret's Olmsted Observatory: From Manual to Robotic in Five Years
Josh Lake

Imaging the ISS–It's Easier Than You Think!
Bob Horton

New Views of the Solar System Thanks to 21st Century Technology
Steve Hubbard

Saturday Program

All day at Seagrave Memorial Observatory

Also featured: Swap Tables, Solar Viewing, Astrophotography Contest, Homemade Telescope Exhibit (bring your telescope) and the whimsical Astro Bake-off Contest!

10:00am **The Amateur Astronomer's Equipment of the 1960s**
Ed Turco

11:00am **Astrophotography on The Cheap**
Scott MacNeill

12:00pm **Lunch at the Skyscrapers Grill**

1:15pm **MEarth Project: Super-Earths Transiting Nearby Low Mass Stars as Laboratories for Exoplanetary Science**
Zachory Berta-Thompson

2:30pm **The Best of all Worlds: Creating Unique and Original Hybrid Images from Professional and Amateur Data Sources** (with emphasis on mining the Hubble Legacy Archive)
Robert Gendler

3:45pm **Harvard's MicroObservatory Project**
Frank Siekiewicz

Saturday Evening Program

At North Scituate Community Center

5:00pm **Reception, Hors d'oeuvres served**

5:45pm **Evening Banquet** (pre-registration required)

7:00pm **Words of Welcome, Awards, and Raffle Prizes**

7:30pm **A Preview of Seagrave Observatory's Centennial, 1914 to 2014**
Dave Huestis

7:45pm **Honorary Awards**

8:00pm **The Design, Construction and Use of a Large Private Research Observatory**
Mario Motta

Dr. Mario Motta has been an amateur astronomer and friend of Skyscrapers for many decades. When he and his wife decided to build a house on the North Shore of Massachusetts, Mario decided an integral observatory was essential. In this talk he will describe the design and construction of the telescope and observatory. For years Mario has used the instrument to obtain spectacular deep sky images which he will share with us. However as President of the AAVSO he also uses the observatory for variable star research. Mario will describe the current variable star images he takes and will share ways amateurs can use AAVSOnet for their own variable star research. AAVSOnet is a network of remotely operated instruments which is used to obtain images used to determine brightnesses of variables and which can be used to report brightnesses to headquarters.

Name _____

Address _____

_____

_____

Send completed form and check (made payable to Skyscrapers Inc.) to:
Linda Bergemann 41 Ross Hill Road, Charlestown, RI 02813-2605

_____	**Registrations**	x **$20** each	$ _____
_____	**Registrations** (children under 12)	**Free**	
_____	**Banquet tickets**	x **$20** each	$ _____
_____	**Banquet tickets** (children under 12)	x **$10** each	$ _____
		Total	**$** _____

Directions to Seagrave Memorial Observatory

www.theSkyscrapers.org

From the Providence area:
Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

From Coventry/West Warwick area:
Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

From Southern Rhode Island:
Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

From Northern Rhode Island:
Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

From Connecticut:
• Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
• or • Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

From Massachusetts:
Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

SKYSCRAPERS INC.

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