August 2024

Grand Strand Astronomers
Monthly Events

General Membership Meeting:
Thursday August 15, 2024 @ 7:00 pm
Meeting: VIA Zoom.
Please see email or Facebook for link

Observing Session: August 3 & 31, 2024 @ 8:00 pm
Location: Hampton Plantation
Gates open @ 6:00 pm

ASTROGATOR

Grand Strand Astronomers

An Astronomiocal Journal of the Grand Strand Astronomers of the Greater Myrtle Beach Aera
GSA Founded on September 24, 2020

Bisti-Mushroom - Hoodoos
Photography by Pat Maccariella-Hafey

Grand Strand Astronomer's Social Media

Grand Strand Astronomer's Website

Grand Strand Astronomer's Facebook

GSA Leadership

Executive Officer
Ian Hewitt

Treasurer
John Defreitas

Photograph not available at this time

Secretary
Gerald Drake

Social Media Corrodinator
Denise Wright

Photograph not available at this time

Newsletter Coordinator
Tim Kelly

In This Issue

Landscaspe Hoodoos

Pat Maccariella-Hafey

Photograph Settings

Canon 5D Mark IV camera with 16-35 III L lens .

Sky was at 16 mm. about 20 seconds Iso 6400.

The foreground with mushroom hoodoos was lightpainted by the workshop leader Brad Goldpaint and at 30 sec, 6400 ISO at 24 mm.

Call For Volunteers

Tim Kelly

Grand Strand Astronomers are looking for volunteers to help with the social media platforms such as Facebook, YouTube and Twitter if the need arises. Presently Facebook needs a new face lift and be brought up to present time activities. Our website can also use some TLC and someone responsible to keep it updated with club activities and astronomy related items. If anyone would like to help in these categories, please contact Ian Hewitt at the email address below.

We are looking for new and older club members to help contribute articles for the GSA Newsletter. You can be a novice level, medium level, or a experienced level astronomer. Knowledge such as types and location of numerous stars, nebula or galaxies to share with other club members. GSA would like to provide topics for all level of members and non-members that are both hands-on projects and educational sharing. You can either write you own or use one already written and published. See Megan's, Chris' and Gerald's contributions for self written articles. See Tim's contributions for an example of non-written subject matter or from a written artical from another person. Please provide the title, name of the originator and website link that the original article can be found. You will not be required to submit articles every month, however every second or third month would be nice and a benifit to all members and non-members. Please send articles to t.m.kelly349@outlook.com

GSA Telescope Loaner Program

Did you know our club has telescopes available for loan? They are Dobsonians that were donated to the club when we first started. These are available for club members to use at no charge. All you have to do is take care of them and return them if someone else wants to borrow one. The first one is an Orion XT 8. It's in great shape. It gives beautiful views of the moon, planets, and galaxies. Comes with accessories that include a 2X Barlow, 25mm eyepiece, 9mm eyepiece, and laser collimator tool. The other one is an Orion Skyquest XT 10 with Orion's IntelliScope computerized object locator. It includes more than 14,000 objects in its database so you'll be able to locate those dim galaxies. Should be hours of fun. Accessories are included. Both of these are begging to be used. Send us an email if you're interested in borrowing one.

Grand Strand Astronomers - Membership

Grand Strard Astronomer's welcomes new members: Laurie Flynn and Bob Perry

GSA Monthly Newsletter Articles

Tim Kelly

This is our club and our newsletter**.** Lets help each topic to continue to grow.

Grand Strand Astronomer's is looking for individuals who would like to participate in submitting newsletter articles dealing with anything astronomy. We can not rely on the same four (4) members to write and send in articles month after month. New thoughts and ideas make for good reading and beneficial growth for the club and the public of the Greater Myrtle Beach area.

One member's simple advancement could just be what a newbie is looking for to get over a hurdle that has been impeding their progress forward. The expertise by many members can be a form of mentoring.

Examples of articles to submit are:

- How did you get interested in astronomy
- What was or is your first telescope
- What is your favorite go-to objects
- Astrophotography
  - When did you start photographing
  - What lessons did you experience during your learning process
  - Submit older photographs taken along with equipment settings
  - Older pictures can be sent in for the first page " Photograph of the Month"
- What is your goal to achieve astronomically
- Explain your personal growth, and journey through this beautiful hobby
- Favorite internet reading stop-off. Send in articles with originator's name and the website hyperlink
- How do you find a galaxy, a nebula, asteroid or comet in the vast reigns of the universe.

I am asking all members to contribute to the expanding of knowledge, enthusiasm, and love of amateur astronomy to new members within our club, and to other who are not members yet, but contemplating in joining Grand Strand Astronomer's. I would rather have too many articles than not enough to make a great newsletter.

Please submit all articles and photographs by the **15 of the month** prior to the next newsletter. Send to t**.m.kelly349@gmail.com**

UPDATE:

We are beginning to receive articles by several of the new members to Grand Strand Astronomers. We strive to share astronomical information for the novice, the knowledgeable and expertise members, Some of these new members are experienced amateur astronomers and astro-photographers who have relocated from other clubs and from other states. I welcome the input to our monthly Newsletter.

Due to the added contributions from members of GSA, this edition of the August 2024 Newsletter is the largest and it is packed with the most information our Newsletter has written.

Lets keep this going ! ! !

Volume 2 Page 5 Number 6

GSA Meeting Recap

Gerald Drake

Meeting was held on 7 /18/24 via Zoom from 7:00 to 8:30. Ian welcomed all to the July meeting and noted that we've had terrible observing conditions. There was open discussion about mounts and guide scope and resolving trailing issues for astrophotography.

Our next observing session is August 3, at Hampton Plantation. Our next indoor meeting is August 15. Note that we actually have two observing sessions in August because of the moon cycle. We'll also meet at Hampton Plantation on August 31.

Tim shared that new members submitted articles for the newsletter. This is great! He encouraged all to submit articles. They don't have to be masterpieces. Simply tell about something you're doing or are interested relating to astronomy.

Ian gave a great presentation on the History of US Telescope Manufactures. This is in relation to the parent company of Orion and Meade closing down and laying off their employees recently. This is not a complete presentation as information on some manufactures is hard to find.

Early in the 20th century, telescope manufactures were European. Except for the high end, very few manufactures made telescopes amateurs could afford. Most were from the UK. He gave some examples. They were all refractors. In 1919 Russell Porter moved to Vermont to work at an optical company and he designed the Porter Garden Telescope. He joined a local astronomy club and wrote several articles for making telescopes. His garden telescope was a unique reflector. He was hired to help design the Hale Telescope at Palomar and was attributed to its success. During this time, most amateurs made their own telescopes rather than buying. From 1926 to the early 1940's; Tinsley Telescope and Instrument made some amazingly good quality telescopes, but high priced. They were out of reach for most amateurs. Post war 1950's saw a surge in science with the beginning of the atomic age and a booming economy. Lower cost refractors started to arrive in the market. Then we see some Newtonian reflectors on equatorial mounts. Still expensive but obtainable. John Dobson started exploring low-cost designs in the 1950's. In 1942, Norman Edmund started building telescopes on a card table in his home using surplus military optical assemblies. There was a lot of war surplus after WW2. He was able to sell these at reasonable prices. Ian showed examples of the telescopes and parts he offered. Then the Korean War began with another military buildup. Thomas Cave and his father started making high quality mirrors for amateurs in 1948. They formed the Cave-Wilkinson Optical company in 1950 and made high quality reflectors. They also sold high quality mirrors for Questar.

The company Criterion was started in 1954 and offered the Dnyascope reflector. They offered 4-, 6- and 8-inch models. In 1949 Lawrence Fine took over his father's business United Scientific/Trading which became Unitron. He wanted to build telescopes. He found that a lot of telescopes made at the time were low quality. He made a trip to Japan in 1951 and worked out a deal with Nihon Seiko to make telescope instruments. They introduced two very good low cost refractors in 1951 to compete with Tinsley. By 1954 they more than doubled their line of telescopes. Ian showed ads from the time for Unitron telescopes. They were a well-respected company.

In the 1960's the space race began and drove telescope demand even higher. Competition grew and new technologies and designs came about. Some companies moved away from telescopes to other scientific ventures.

In the 1960's the space race began and drove telescope demand even higher. Competition grew and new technologies and designs came about. Some companies moved away from telescopes to other scientific ventures.

Tom Johnson was owner of Valor Electronics in California in the 1950's. He started making mirrors for personal telescopes, then starts Astro-Optical division of Valor Electronics. In 1962 he appears on the cover of Sky & Telescope with a custom built 18.5" Schmidt Cassegrain Telescope at a star party.

In 1964, he turned his company into Celestron and began a new technique for making Schmidt corrector plates economically using spherical primary mirrors. Initially produced 20 and 22 inch SCT's. By 1969 he included 6, 8, 10, 12, and 20 inch SCT's. Note these were blue in color.

Coulter Optical was started by Jim Jacobson in 1967 and adopted designs by John Dobson. He could make some large aperture at very competitive prices. His original telescopes were blue, but later he changed them to his signature red.

The 1970's saw more changes. Celestron's C-8 had a huge appeal because it was portable and affordable. Pushed the pricing for reflectors. The C-8 was good at everything, but not great at anything, but it appealed those who live in the city. Traditional companies started losing market share when they could not keep up with technology and cost.

Cave sold his company in 1979 and it was soon liquidated by the new owners. Criterion tried to make an SCT, but it was a disaster with cheaply made fork and shaky mount. Celestron picked the classic orange color for its tubes in the 1970s. Became their signature color. Edmund scientific created the Astroscan, a small reflector telescope (4-1/4 inch) that you could set on a table.

Meade was started by John Diebel in 1972. Cut a deal with Cave Optical to sell them his imported telescope parts at cheaper prices, then Cave bypassed him and went straight to the Japanese. This ruined their friendship. Meade first started with Japanese refractors, then started Newtonian reflectors.

Their goal was to be the biggest telescope company ever. Orion Telescopes was founded in 1975 by Tim Giesler. Operates as Optronic Technologies and was employee owned. They made some very good Dobsonians at reasonable prices. They had a storefront and mail-order business. Ian shared some ads from the 1980s. Very recognizable telescopes were offered then.

In 1981, Unitron was bought by Nikon. In 1986 they rebranded the very bad Dynamax and that division was taken private. They focused then on microscopes. Criterion was bought by Bushnell (Bausch & Lomb) around 1982. After a while, they quietly closed this business.

Tinsley slowly migrated to precision optical projects. Operates today as TIOS. They were called upon to create optics to fix the Hubble Space Telescope.

The 1980's saw Meade entering the SCT business. In 1980 Celestron is sold. At that same time Synta Technology Corporation is formed in Taiwan. 1984, Celestron changes from its signature orange tube to black color. Goto technology starts appearing and changing the market. There was some resistance to this technology. Purist thought it ruined the hobby. But really it opened up the hobby to people who did not have to learn the night sky, although you still should.

Now in the modern era, change continues. Celestron introduces Fastar for photography in 1990, then they send one of their C5 telescopes aboard the space shuttle in 1992. Meade starts manufacturing telescopes in Irvine, CA. Celestron hits some trouble in 1997 and is bought out by Tasco. Celestron still sells a lot of telescopes. Tasco brand does not do so well.

In 1999 Synta starts the Sky-Watcher brand for non-US markets. They make many components for Orion. In 2001, Tasco folds. Celestron still had their name and still sold telescopes. So, Meade tried to acquire Celestron. The SEC did not agree because that would make a monopoly. The original owners get Celestron back after Meade loses their court battle.

In 2005, Sytna acquires Celestron and Imaginova (a holding company lead by CNN's Lou Doubs) acquires Orion. In 2008 Explorer Scientific is created by ex-Meade people in conjunction with Jinghua Optics of China. They make good refractors and are well known today.

In 2009 Meade under financial pressure, moves its manufacturing to Tijuana Mexico. Late 2000's Sky-Watcher starts selling in the US market. In 2011 Suzhou ZWO is formed.

They are known for cameras, but branch into optics and telescopes. In 2013 Meade still under financial pressure merges with Sunny Ningbo from China. At the same time Explorer Scientific becomes completely US owned being purchased by Journey North Inc (2014).

In 2019 Optronic (Orion) files a lawsuit against Synta and Sunny Ningbo. At that time Meade made about 80% of the telescopes sold. Orion accused Synta of funding Sunny Ningbo acquisition of Meade and subsequently collaborating to fix prices to beat anti-trust laws.

Synta settled with Orion, then their Taiwan operations dissolved and all its manufacturing moved to its partner company Suzhou Synta of China. Sunny Ningbo went to court and lost a $16.8 M settlement. Meade declares bankruptcy and Orion acquires Meade. Obivously they didn't get much of that settlement because in July of 2024 Optronic (Orion and Meade) ceases operation. They closed their storefront and laid off all their employees. Includes the manufacturing facility in Tijuana. Their websites are still up, but I would not advise placing an order with them.

Other manufactures that are no longer taking orders include Obsession (Dob manufacture) and Teeter (another Dob manufacturer). Also, Questar which we did not talk about because they were kind of unique. Now the future. Smart telescopes are appearing as are new companies. Celestron Origin is a high-end smart telescope with camera built in. ZWO See Star is getting a lot of attention from amateur astronomers. Also Dwarf and Vespera are getting into the smart telescope market.

After the presentation we had a general discussion about Orion and what could have gone wrong. Who knows what happens to all of the components they still have on hand. There is a lot of speculation and we may not know for a while. It will be a process. Discussion about Celestron and Sky Watcher as they are now the leaders in this field. Discussed the customer service of Meade vs Celestron. Meade was not good at it while Celestron is.

Cloudy Nights is a website that gives some news and information. They may have some updates. Access it at https://www.cloudynights.com/

Highly recommend watching this full presentation on YouTube at: https://www.youtube.com/watchv=SX3lFF-YpAs&t=3052s

The live stream was ended at this point and we carried out some club business. A question was asked if Hampton was still trying to achieve Dark Sky Sight status. They have elected not to pursue the rating because it was cost prohibitive. They are still meeting all of the requirements of a Dark Sky location and they are our go-to location for dark sky viewing.

The nomination for officers was conducted with Ian Hewitt being nominated to continue as executive officer, John DeFrietas was nominated to continue as treasurer, and Gerald Drake was nominated to continue as secretary. It was determined we had a quorum for this meeting per the by-laws, so the nominations stand.

An email will go out to the club regarding the nominations and we'll finalize elections at the August meeting.

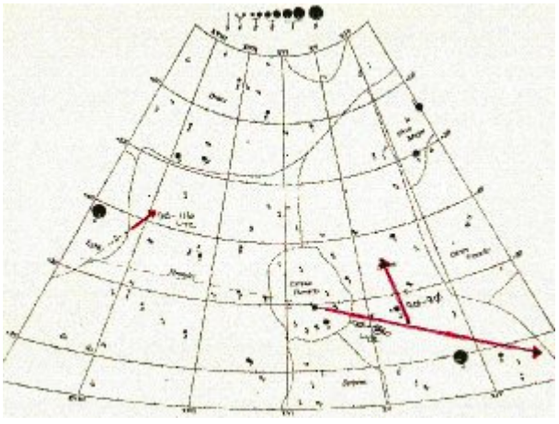
Meeting concluded.

Meter Shower Visual Observing

https://www.amsmeteors.org/ams-programs/visual-observing/

American Metor Society
Ken Legal

Meteor Science is one of the few remaining astronomical fields where amateur astronomers, equipped with only their eyes, can provide a valuable service to the planetary science community. Because bright city lights and cloudy weather often prevent us from viewing the sky,chances are that few observers, if any, are watching meteors on any particular night.



Two April Lyrid meteors and one sporadic meteor recorded by then novice plotter James Richardson in the early morning hours of April 22, 1990, from Loma Prieta peak, California.

Brief meteor outbursts and bright fireballs can occur unnoticed. So, if you watch the sky, you may be the only observer of one of these rare events. When more observers watch each night, there is a better chance of observing and reporting fleeting meteor spectacles. This is the reason we encourage all observers to take advantage of clear skies and to observe meteor activity as often as possible.

Charles Olivier formed the American Meteor Society in 1911. The new organization's goals were promoting and managing amateur participation in the field of meteor astronomy. Nearly one hundred years later, the society's visual observers are still scanning the skies for meteoric activity and reporting their observations. Today, global communication is nearly instantaneous and it is far easier to provide activity alerts and to share your meteor data with the world's observers.

The purpose of this page is to provide (on-line) the forms and instructions used by participants in the AMS Visual Observing Program to record their meteor data collected in the field, as well as presenting periodic reports on the visual meteor activity seen by our observers. Once received by the visual coordinator, copies of these data are then distributed to other interested organizations, such as the International Meteor Organization (IMO), as well to as individual amateur and professional astronomers (both AMS and non-AMS) who are interested in utilzing the data for a particular study. Additionally, this page also contains a number of papers and articles written by present and past AMS affiliates on the topic of techniques for visual meteor observing and data reduction.

For more information and instructions on getting started in this endeavor, please contact our Visual Observing Program coordinator, Robert Lunsford.

Meteor Viewing Basics

We all at one time or another have seen a shooting star zip through the heavens. If you are interested in increasing the odds of seeing this phenomena, there are some important factors you should consider:

On an annual scale, from the northern hemisphere, more random (sporadic) meteor activity will occur during the second half of the year. From the southern hemisphere, almost the opposite is true with the first half being more productive.

There are actually two peaks visible from the southern hemisphere, one in January and the other in early July. It was once thought that the angle of the ecliptic during different seasons played a role in this variation. Studies have revealed that there is simply more activity to be seen from weak and unrecognized radiants, producing the sporadic meteors, during these times of year from each hemisphere.

On a daily scale, dusk is the worst time to view meteor activity. The reason for this is that at this time, you are viewing the area of the sky from which the Earth is receding. Therefore any meteor must catch up to the Earth in order to be seen. This is often compared to a vehicle driving through rain or snow. One will see more raindrops or snowflakes hitting the front windshield compared to the rear window. At this time you are looking through the rear window.

As the night progresses the numbers of meteors visible will increase. As the Earth rotates toward the apex (the point in the sky where the Earth appears to be traveling toward), meteors striking the Earth from perpendicular angles and those striking the Earth from head-on will become visible. The best time to see meteor activity would be the period just before the start of morning twilight, when most of the meteors will be striking the Earth from a “head-on” position, much like looking through the front windshield of a vehicle during rain or snow.

There is even a more important factor when trying to see meteor activity; is there an active major meteor shower visible tonight? If there is then you have the opportunity of seeing up to ten times the normal numbers of meteors visible. There are only nine meteor showers than are considered major. They are the Quadrantids (Jan 3-4), Lyrids (Apr 22), Eta Aquarids (May 2-10), Delta Aquarids (Jul 26-30)**, Perseids (Aug 5-19)**, **Orionids (Oct 18-26)**, **Leonids (Nov 18)**, **Geminids (Dec 10-16)**, and the **Ursids (Dec 22)**. These major showers vary in intensity but all are best seen during the early morning hours. Viewing the morning sky during these periods will offer much more activity as these showers will combine with the normal sporadic activity to produce a good show. The absolute ten best mornings for viewing meteor activity are: (in order of strength) Dec 14, Aug 12, Dec 13, Aug 11, Aug 13, Jan 3, Dec 12, Oct 22, Aug 10, and Dec 11. Since the Earth encounters these showers every year at the same time, these dates will usually remain the same year after year.

Finally, the sky must be as dark as possible for you to see the most activity. If the moon is above the horizon, it will certainly brighten the sky. There are years when a bright moon will ruin most of the dates above. There is nothing you can do about this coincidence except put up with the moonlight or wait until the next favorable date. December 14 and August 12 (the peak mornings of the Geminids and Perseids) will still produce more activity with moonlight than all the others without. They should not be missed regardless of the conditions.

There are other factors to help you see more activity that are more within your control. The location of your watch is important. Since city lights will obscure the fainter meteors, it would help immensely to watch from darker rural skies. Viewing comfort is also desirable. You should use a reclining lounge chair so that you are comfortable. It is also a good idea to nap before a watch and to be well rested when attempting to observe. You certainly will not see much meteor activity through closed eyelids!

If you consider these factors when planning your observing schedule, you will surely see enough meteors to fulfill all your wishes!

Suggested Observing Strategies

The most popular strategy is to view when meteor activity is strongest. Besides, who wants to be out when one sees only one or two meteors per hour? That's about as exciting as watching the grass grow! There are approximately ten mornings each year when the meteor activity is exceptional. This is when a majority of the meteor observers are out. This is also when the year round observers get rewarded for their efforts. Wouldn't you know it though that a majority of these nights have a full moon or are clouded out! Well, it seems that way to a lot of us who have been around for a long time.

What about the other 355 nights per year? Well, these are the nights when real discoveries are made and surprises lie in wait. Yes there are those nights when the activity is so sparse one can barely stay awake. Yet it's the fact that you might be the only person on earth at that moment concentrating on meteor activity that keeps you going. Who knows, you may witness a rare meteor from the Tau Herculid shower or the start of a flurry of activity from the June Bootids. Sometimes there is an unexpected display of activity from a new or dormant radiant. While the major showers are the most entertaining, real discoveries are made on nights when nothing out of the ordinary is expected.

There is at least one minor shower active each night of the year. There are radiant lists where a hundred or more showers are listed. Recent studies using unbiased video equipment has shown that there are only three dozen radiants active throughout the year that produce enough activity that is easily visible to the unaided eye. Less than a dozen of these produce rates of ten meteors per hour or better. The other two dozen produce rates lower than the sporadic background. These minor showers are often ignored and are in need of constant monitoring.

The American Meteor Society encourages observers to monitor these minor showers so that any abnormal activity may be observed and reported. Occasionally we also ask observers to monitor the skies on selected dates to verify activity reported earlier. For motivated observers, the A.M.S. also encourages observations on nights when little or no activity is expected. It is these observations that alert us to new activity and the prospect of a new shower in years to come.

AMS Visual Meteor Observing Forms and Instructions

- Basic Visual Meteor Observing Form, Basic form for recording information on your observing session and the data collected on each individual meteor seen.
- Advanced Visual Meteor Observing Form, Advanced form for recording information on your observing session and the data collected on each individual meteor seen.

Visual Meteor Observing Papers and Resources

- Suggestions for Visual Meteor Observations, a review of observing and plotting techniques, by senior AMS affiliate — Norman McLeod

Restoring a Classic: The Journey of Reviving a Celestron C8

The story of how an old Celestron C8 telescope found a new lease on life begins at a Habitat for Humanity, where it caught the attention of our club member, Gerald Drake. He notified the club, guessing someone would see the potential in this weathered instrument. As an astronomy enthusiast and occasional telescope restorer, I couldn't resist the challenge and decided to bring this classic back to its former glory.

The Restoration Process

Upon close inspection, it was clear that the corrector plate, primary, and secondary mirrors were incredibly dirty. To restore their clarity, I had to strip the scope completely. Using a mix of distilled water and alcohol, I carefully cleaned the optics with Pec Pads. These pads are non-abrasive, lint-free, and specifically designed for cleaning delicate surfaces like telescope optics. I applied the cleaning solution liberally and used a compressor to blow off any remaining moisture, thus preventing water spots. Given the level of grime, this cleaning process had to be repeated several times to achieve the desired clarity.

Reviving the Tube

The telescope’s tube was another story. It was heavily weathered, showing the signs of a long and well-used life. My first attempt to clean it with a light abrasive sheet only highlighted the contrast between the cleaned sections and the original, rough texture. Committed to achieving a consistent appearance, I sanded down the entire tube, primed it, and repeated this process multiple times until the surface was even.

The Color Dilemma

Choosing a new color for the tube was a challenge. I've never been fond of the original orange, so I experimented with various options. My first attempt was black, which didn't satisfy me. Next, I tried a traditional white, but gloss wouldn’t have worked with the texture of the tube. I tried Matt White but that didn’t work either. A blue similar to that used on Meade Telescopes was also a consideration, but it presented two issues: it could confuse people into thinking it was a Meade LX90, and it didn’t complement the hammertone finish of the end caps.

Ultimately, I found a rattle-can of orange paint at Lowe's, closely matching the original Celestron shade. Surprisingly, once applied, the classic orange brought the telescope back to its iconic look, and I was happy with the result.

Mounting Challenges

The telescope did not come with a mount or a tripod, which presented an additional challenge. How to mount it. I purchased a dovetail to attach to the telescope, so it could be mounted on my existing Celestron SE mount. To secure the dovetail, I had to drill and tap the corrector-side ring, to ensure a stable and secure attachment. I then attached the telescope to the mount using the mount’s existing dovetail arrangement.

Final Touches and Future Plans

After restoring the C8 to its original aesthetic and functionality, I conducted brief daytime tests to check the optics. The initial results were promising, although I suspect the telescope will need collimation for optimal performance. Once that's done, I'll take a few images through it to assess its capabilities further. I have also purchased a Celestron Sticker for the scope; for when it's completely finished, and may sell the scope after a few shots of the moon, or something...

Though I have restored a couple of old telescopes over the years, this one has been the most satisfying. The satisfaction of bringing this Celestron C8 back to life might make it hard to part with.

My existing collection is becoming a bit of a burden for space, and perhaps it's time to consider selling a few, making this one an almost certain probability; for someone else to enjoy. But for now, I'm simply enjoying the success of this restoration and the joy it brings to look at a piece of astronomical history, revived and ready for use. It's a pity we can't get hold of the original owner, for them to see it in it's almost original glory.

Clear skies, everyone!

Is There Gold On The Moon

StarLink
By Tom Urbain
Last Updated: June 20, 2024

The short answer to the questions posed in this article title is: Yes! gold traces have indeed been identified within the lunar soil. Back in October 2009, NASA conducted a mission called LCROSS, which involved crashing a booster rocket into the Moon at nearly 6,000 miles per hour.

A second spacecraft equipped with a spectrometer followed closely behind to study the plume of debris released by the impact. The chemicals detected during the analysis include carbon monoxide, carbon dioxide, ammonia, sodium, hydrogen and small traces of gold, silver and mercury. Although the sample size was relatively small, it nonetheless corroborated the presence of gold beneath the lunar regolith. Despite 14 years elapsing since this discovery, measuring the precise quantity of lunar gold has proven to be a challenge so far, primarily due to its subterranean location.

Why would there be gold on the Moon?

There are two plausible ways that gold may have found its way to our natural satellite:
1. Meteorite Impacts: The Moon has been bombarded by meteorites throughout its history, and some of these meteorites could contain gold. When a meteorite impacts the Moon, it can vaporize, melt, or scatter its materials, including gold, onto the lunar surface. For example, asteroid Psyche 16 is apparently holding enough gold to make every human a billionaire, so it's not far-fetched to think that, throughout its 4.53 billion years of existence, the Moon may have received a few "golden packages" from crashed asteroids.

2. Lunar Formation Process: When the Moon formed about 4.53 billion years ago, it was created from the debris of a massive impact between Earth and a Mars-sized celestial body. During this process, some gold from Earth and/or the impacting body may have been.

Where did this gold originate from?

Gold and other heavy elements are created through nuclear reactions that occur in extreme environments. One such cataclysmic event is the explosion of a dying star: a supernova.
During a supernova, the star's core collapses, and its outer layers are ejected into space at incredibly high temperatures and pressures. The extreme conditions during a supernova create an environment where nuclear reactions can produce heavy elements like gold.

The newly formed elements are then dispersed into space, eventually becoming part of interstellar gas and dust clouds. Over the following millions of years following such a powerful cosmic event, some of those elements may find their way into the dust and gases that will eventually coalesce into protoplanets.

Could this gold be mined from the lunar surface?

The idea of mining the Moon is not new, but the challenges that come with it are significant:
Cost: The cost of mining on the Moon will be incredibly high, and it is not clear if it would be economically viable. Building a mining infrastructure on the moon would require a significant investment of resources and technology.
Technology: The technology required for mining on the Moon on which the gravity is much weaker than on Earth will need to be highly specialized.
Environmental Factors: The moon's environment is harsh, and mining would be challenging. The lack of atmosphere means that the surface is exposed to solar radiation and extreme temperature fluctuations, which could damage mining equipment.
Legal Issues: The Outer Space Treaty of 1967 prohibits countries from claiming ownership of the moon or any other celestial body. This means that any mining activity on the moon would have to be done in partnership with other countries or organizations. In preparation for the Artemis mission, the introduction of the Artemis Accords was done very recently in order to authorize the mining of the Moon for scientific purposes.
Transportation: It is estimated that it costs around $10,000 to transport one pound of material from Earth to the moon. This cost would need to be significantly reduced in order for lunar mining to be economically viable.
Established Human presence: There are currently no permanent human settlements on the moon, and building the necessary infrastructure would be a massive undertaking. This includes everything from housing and transportation to power and communication systems.

Would it be worth it to mine gold on the Moon?

At this moment in time, probably not. While it has been proven that the moon contains gold, the amount and accessibility of these resources are still unknown. Mining on the moon could be a high-risk investment with an uncertain return. We just don't know how much gold there is on the Moon, mainly due to the lack of surface missions over the last 5 decades. More research would need to be done to assess**.**

The other point I'd like to raise is that there are other resources on the Moon, such as water ice and rare earth elements, which are more valuable and relevant for future lunar missions and exploration. As a space exploration fan, I think that mining these resources should be prioritized over gold due to their potential usefulness for sustaining human presence on the Moon and enabling further space exploration**..**

While it would be naive to not assume that numerous corporations are currently strategizing how to extract resources from the solar system for profit, such as through asteroid mining, my hope is that these commercial endeavours will not come at the expanse of scientific activities and the advancement of space colonization and outer space exploration**.**

Landscaspe Hoodoos

Pat Maccariella-Hafey

I took this in May of 2023 in the Bisti Wilderness at a milky way photography workshop the week of May 9-13, 2023. I joined several other photographers for a Milky Way photography workshop with Brad Goldpaint of **(www.goldpaintphotography.com**). This was my fifth workshop with him since 2017. This workshop's venue was the unique landscape hoodoos and rock formations of the Bisti/De-Na-Zin Wilderness, which is located just south of Farmington, New Mexico off of route 371.

After driving from Farmington where we were staying to the Bisti Wilderness area, we hiked about 2.5 miles in with all our equipment to get to the hoodoos. It is like another planet there as you can see.

Hiking out in the dark when finished proved to be tedious and we had our head lamps for sure. We shoot for several nights and shoot all types of compositions from sunset to Milky Way to star trails and even some with moonlight rising with the Milky Way.

Brad also includes two meeting room work shops about 4 hours long each to help us process the foreground shot and also the sky shot and then blend them. Processing is tedious as you all well know. I used a Canon 5D Mark IV camera with 16-35 III L lens . Sky was at 16 mm. about 20 seconds Iso 6400. Brad light painted the hoodoos for us. Although I have a lot of photos from Brad's workshops, I really like this one because of the light flowing on the hoodoos and the beautiful Milky Way**.**

How Many Moons Do The Inner Planets Have?

StarLust
Written by Tom Urbain

The inner planets are Mercury, Venus, Earth, and Mars. Moons start appearing from Earth and beyond.

Mercury has no moons
Mercury is too close to the Sun and too tiny to be able to hold a moon in orbit around it. Any celestial object that attempts to revolve around Mercury would find itself crashing into the planet or be pulled into an orbit around our Sun (and eventually crash into the Sun too).

Venus has no moons
Some scientists say that Venus (which orbits the Sun at 67 million miles) is still too close to the Sun, and any moon that the planet might have had would have been destroyed by tidal gravitational forces. Some theories hold that there might have been an escaped moon in Venus' history. Venus might have experienced two major impacts. The first had it spinning counterclockwise and created a moon, and the second reversed its direction to a clockwise spin. But the second impact would have changed the gravitational interactions between Venus and its moon, causing it to either drift away or crash into the planet).

Earth has one moon
Earth is the first planet from the inner solar system to possess a natural satellite. Earth's natural satellite is called Moon because at the time of its discovery our moon was the only one known. Our Moon formed when a small planet the size of Mars impacted Earth. This impact launched some of Earth's outer material into space, where it morphed into our moon. A recent model suggests that this impact distorted Earth a little bit, and by extension, its gravitational field. This distortion allowed our planet to hold onto its moon.

Mars has two moons
Mars, which is named after the Roman god of war, has two known moons: Phobos and Deimos, also inspired by Roman mythology. Phobos means fear and Deimos refers to terror. The American astronomer Asaph Hall discovered the two moons in 1877, and their irregular shape and carbon-rich composition suggest that they may be captured asteroids.

Mars and its two moons. Source: NASA

Phobos

With a diameter of 14 miles, Phobos whips around Mars at a rapid 8 hours from a distance of 6,000 km (3,700 miles). It is the only moon in the entire solar system to orbit this close to its host planet.
Due to its short distance, Mars is exerting strong gravity on Phobos. Astronomers predict that in another 50 million years, the moon will either crash into Mars or crumble to pieces and remain in orbit**.**

Phobos - NASA

Deimos

Deimos is 7.7 miles in diameter and orbits Mars at 48 million miles, a distance from which it takes 30.3 hours to complete an orbit. The moon's gravity is so low that the ejecta from any meteorite impact will escape into space instead of settling on the moon's surface.

Deimos - Source NASA

How many moons do the outer planets have?

The planets in the outer solar system: Jupiter, Saturn, Uranus, and Neptune, have more natural satellites than the inner terrestrial planets. That's because they formed in the outer, colder region of our solar system where water froze to ice (instead of becoming steam like near the terrestrial planets).

Since water in its ice form accretes more easily and the giant nature of the outer planets left a rich surrounding disk after their formation, the leftover material morphed into tiny moons that we see today. Most of the moons have circular orbits on their planet's equatorial plane, with a handful above and below.

The gas giants are true to their name: they are very large. As a result, their gravitational pull sometimes captures passing asteroids (the irregular moons and satellites).

Jupiter has 79 moons

Jupiter has 79 moons in total — 53 named and 26 in the waiting line to receive official names. Of them, the four largest moons — the Galilean moons — are studied the most. They are Io, Europa, Ganymede, and Callisto.

Out of all the known moons in the solar system, Io is the most volcanically active, and colorful too! Europa is one of the moons being considered for possibilities of life. What we see on the surface is ice, but astronomers say there may be a salty ocean underneath, protected from freezing by the icy layer above and kept warm by Jupiter's tides. We then move on to Ganymede, the largest moon in our solar system.

With a diameter of 3,273 miles, Ganymede is so huge that it boasts its own magnetic field — the only known moon to do so.

With a diameter of 2,990 miles, Callisto is Jupiter's second-largest moon with a surface completely dotted with craters.

Europa. Source: NASA

Saturn has 82 moons

Saturn has 82 moons in total — 53 of which are confirmed and 29 are awaiting official names. Their size ranges from 123 miles (Mima) to 1,600 miles (Titan). Two are studied the most: Enceladus and Titan.

Enceladus
We learned earlier that Europa might have an ocean hidden underneath its icy structure.
Enceladus sprinkles its own ocean into space, so much so that it has a ring of ice particles in an orbit around itself. It is also the most reflective moon in our system; because it reflects so much of the sunlight, the surface temperature is as low as -330°F.

Enceladus - NASA

Uranus has 27 moons
Uranus has 27 known and named moons, and the names for most of them are inspired by mythological characters, plays, and poems. Ophelia and Puck come from Shakespeare's plays, Belinda and Ariel come from Alexander Pope's poems. The ones that are most studied are Miranda, Ariel, Umbriel, Oberon, Cordelia, and Ophelia.

Neptune has 14 moons
Of the 14 moons that orbit Neptune, Triton is the most famous. It has a reflective surface like Enceladus and as a result, is the coldest known moon in our system with a temperature of -400°F. It is also the only moon that orbits its planet in a direction opposite to the planet's rotation.

Pluto has 5 moons
Pluto has 5 natural satellites in total: Charon, Nix, Kerberos, Styx, and Hydra. Charon is the largest and innermost moon among the 5.

How Many Moons Are There In The universe?

We do not have the technological capability to determine the exact number of natural satellites in our universe. However, we know that there are about 2 trillion galaxies in the universe, and each of those galaxies may contain at least 100 billion stars. These stars could be host to one or more planets, and each of these planets could have anywhere between 1 to several hundred moons. Based solely on those hypothetical numbers, we can conclude that the number of moons in the universe could easily exceed 1 trillion.

Conclusion

Among the wide variety of celestial objects found in our solar system, we have 210 moons (Earth 1, Mars 2, Jupiter 79, Saturn 82, Uranus 27, Neptune 14 and Pluto 5) of varying sizes, shapes, and properties. What all of them have in common is their faithful orbit around their host planets. Some are exciting places to search for life, but many are fascinating worlds of their own.

Improving My Observing Experience - By Keeping A Log

George Zan Ken Legaletakos, STAR Astronomy Club, NJ
Provided by Ken Legal

My interest in astronomy started with a school trip to the Hayden Planetarium. Under the darkened dome with what appeared to be a million stars, the lecturer pointed his light-pointer at a bright star and asked if anyone could identify it, and much to my amazement someone did. I couldn't believe that anyone could recognize an individual star out of all the stars glowing on the dome. That event, with a purchase at the planetarium bookstore, sealed the deal…I became totally enthralled with astronomy.

This led to a Christmas gift of a Dynascope 4-inch reflector. Great scope optically with a mount that was horrid! I don't know how I ever used it but I did and the first glimpse of the moon really wowed me. I loved looking at Jupiter, Saturn and always the moon. Eventually I decided to move up and built an 8-inch reflector with commercial parts and a real equatorial mount with clock drive. I got a copy of Norton's Star Atlas and Atlas Coeli with its accompanying catalog. From my backyard in Brooklyn, I viewed many Messier and NGC objects. My favorite targets were the deep sky objects, Clusters, galaxies and planetaries, (The "Faint Fuzzies"). After each session I would mark off in the Coeli Catalogue each object with translucent markers. I saw all the Messier objects except for 12. In all, I marked off 255 deep sky objects by the time I was 16. I had a catalogue with lots of translucent marks.

Fast forward to 2002…When I retired, I knew I would have time to devote more time to observing so a new telescope was needed. I went to NEAF (the NorthEast Astronomy Forum in Rockland, NY) and purchased a 4-inch Vixen refractor with a GoTo mount. It was light and it could be easily carried to and from the garage after each use. Since I had a few extra dollars, I also purchased the S&T Pocket Sky Atlas and the Sky Atlas companion which gives description for every non-stellar object in the atlas.

With the new setup I was able to find any object within a minute. Instead of star-hopping and mentally reversing star patterns all I had to do was input some numbers and voila, it was in the eyepiece! Since I was able to view 6-10 objects in an hour, I decided to keep a log of everything I saw. I joined STAR Astronomy Club and was invited to go to a star party at Stokes State Park in northwest NJ, which had magnitude 5 skies. At some point that night I wanted to see the Veil Nebula in Cygnus. I knew that it would be a difficult target with a 4-inch telescope but I set the GoTo to NGC 6995 and saw nothing. I kept looking using averted vision and after about a minute the nebula was right there, not hard to see. The extra time I kept looking sensitized my vision so what was originally not seen became easily seen. I was pleasantly surprised and asked a friend if he could see the nebula and at first it was not visible to him, but after a minute he too was able to see it. Now it was obvious to me that just looking at an object for 10-20 seconds was cheating me of what was really there. Now any time I looked at an object I looked at it for at least a minute or two. That is the difference between looking and observing, taking the time to carefully look through the eyepiece and let your eyes adjust.

One way to adjust your observing at the eyepiece is to keep a log of your observing sessions. I would for each session; head the top of the page with the date, telescope used and overall sky conditions. Then for each object I would write a brief description. For example:

OPEN CLUSTERS…Is it condensed or sparse, approx. number of stars, does the cluster stand out, magnitude of brightest stars, do the stars vary in brightness, any stars of unusual color, overall size.

GALAXIES…Shape, round oval or spindle? Is it evenly bright or does it have a bright nucleus?...and its size.

PLANETARIES… Its color if any, its shape, is it clearly defined, does it appear differently with a filter.

GLOBULARS…Is it resolvable into stars at its edges or central area, brightness and is it uniform in density.

DOUBLE STARS…Brightness of each star, colors and Position Angle.

PLANETS…Sketch it (doesn't have to be a work of art) and as you keep observing more and more detail will appear.

If I couldn't see an object I would put: OBJECT NOT FOUND.

These are the bits of information I would log for each object observed. It doesn't take more than a line or two. The next day after an observing session I would enter the date into the Sky Atlas Companion for each object seen, this way I could always see if I had viewed a particular object or see if current observation matched a previous one.

An example page:

2019-Oct 18 C-11 Very clear dark sky

M52 Beautiful open cluster. Triangular in shape 50-100 stars mostly magnitude 9-10. Brightest star mag. 8

NGC7790 Small cluster of mag 20 and fainter stars Maybe 15+ stars with some fainter barely resolved on East side. Not compressed. Unremarkable.

NGC 7789 very pretty large 100+ stars. Mostly mag.9 dark sky showpiece.

Bottom line is, by keeping a log I took the time to really observe and look for different features and my observing skills increased markedly. The improvement in my observing skills was very apparent this year observing Jupiter, Saturn and especially Mars. It gave me great pleasure when I would compare my sketch of Mars with one of our club's member's excellent photos and be able to confirm what I saw visually.

Keeping a log also greatly increased my enjoyment of observing. Rather than just looking and seeing an object, I was looking and finding particular interesting features.
I highly recommend keeping a simple log…I know it will increase your enjoyment of looking at the heavens.
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Recommended books:
The Pocket Sky Atlas and The Sky Atlas Companion,
Double Stars for Small Telescopes by Sissy Haas

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I mentioned logging the size of an object. Some might benefit from the following.
To calculate the Field of View for any eyepiece, take the manufacturer's stated FOV and divide it by the magnification it gives for the telescope in use.

Example: I use a 27mm Eyepiece with a 72-degree FOV and it provides 104x in my C-11, so 72 degrees/ 104 = 0.69 degrees, not exact but a very good approximation.

** USED WITH AUTHOR'S PERMITTION **

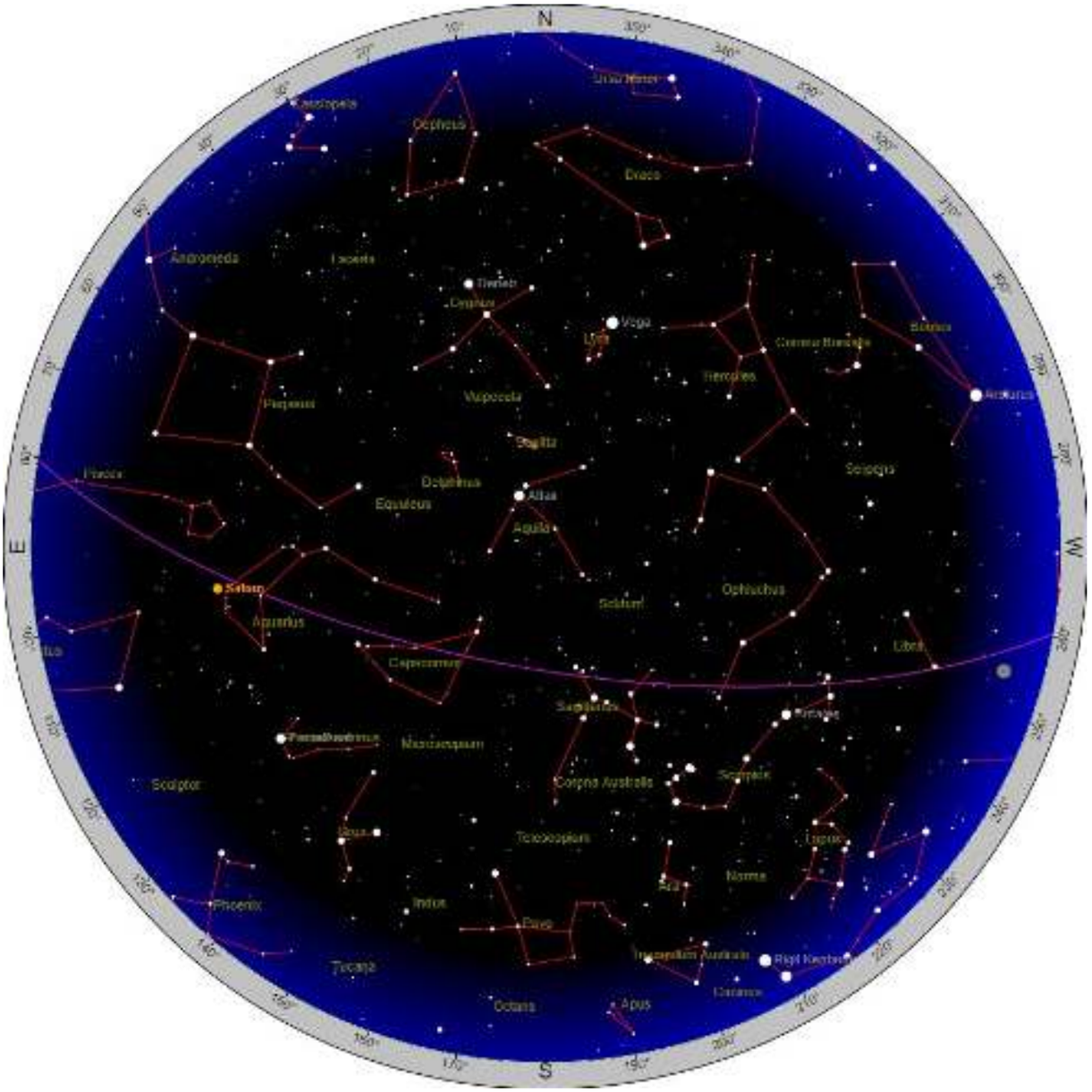
Asteroids

This table shows the brightest currently observable asteroids. Click on the name of the asteroid to get more details, including finder charts.

Asteroid	Brightness	Altitude	Constellation
1 Ceres	7.7	57.9°	Sagittarius
4 Vesta	8.3	-38.6°	Cancer
7 Iris	8.5	43.0°	Aquarius
40 Harmonia	9.0	52.8°	Sagittarius
2 Pallas	9.7	52.1°	Serpens
16 Psyche	10.0	41.1°	Capricornus
42 Isis	10.1	60.1°	Sagittarius
15 Eunomia	10.1	-45.8°	Taurus
39 Laetitia	10.5	-17.9°	Pisces
43 Ariadne	10.6	58.6°	Ophiuchus
194 Prokne	10.7	15.7°	Pisces
532 Herculina	10.8	29.0°	Virgo
68 Leto	10.9	55.8°	Scorpius

Warning!
Never attempt to observe objects close to the sun without taking the proper precautions. In particular, never point optical instruments near the sun and look through them, or you risk permanent eye damage or blindness.

Heavens Above Sky Chart
Set For August 15 at 00:00 Hours



Year	Month	Day	Hour	Minutes	Seconds
2024	August	15	00:00	00:00	00:00

And remember to always look up!