



# the Skyscraper

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December 2024

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

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**Seagrave Memorial  
Observatory  
Open Nights**  
December 7, 21 & 28  
@ 7pm

## December Meeting & Holiday Celebration

**Saturday, December 14 @ 5:00pm EDT at North Scituate Community House, 546 West Greenville Road, North Scituate, RI 02857**

In-person and on Zoom (Contact Linda Bergemann ([lbergemann@aol.com](mailto:lbergemann@aol.com)) for the Zoom link.

Our December meeting will be on the second **Saturday, December 14**. We will begin early, at 5 PM, with a **Holiday Potluck Dinner**, followed by our speaker, Steve Hubbard, at about 6 PM. Steve's presentation will be about his recent trip to Alaska to view aurora. Please bring your family and join us to celebrate the holidays! RSVP to Kathy Siok ([kathys5@cox.net](mailto:kathys5@cox.net)) if you plan to participate in the potluck dinner.

### Alaskan Aurora Report by Steve Hubbard

In High School, I was very fortunate to have a friend who was a member of the school Astronomy club. He invited me to a meeting and I found that I was immediately hooked and started a long journey of telescope viewing, sometimes telescope making and travel to many places to catch some incredible astronomical events.

One of the members of the club had an uncle who was a member of the Skyscrapers which is how I was first introduced to our august group in the dim long ago past of 1973. Hard to believe that I've been a member for over 50 years now!

I still enjoy visual observing, some light imaging, especially of the Sun and planets and am very fortunate to be able to still do some traveling to total eclipses of the Sun, southern skies below the equator and most recently, Alaska in March to see the Northern Lights.

Many of us have been fortunate to see some great displays of Northern Lights from our latitude recently. Others have made journeys to places such as Iceland or in the case of my wife Sue and I, Alaska to see them.

10 years ago, Sue and I joined noted science author and speaker Bob Berman on a tour to the Fairbanks Alaska area where we saw the Northern Lights and this year, with the return of another peak of solar activity, we did a return trip with Bob again.

This past March, despite a depressing forecast of clouds for our entire time in the Fairbanks area, we lucked out and had 2 wonderful nights of good auroral activity from a remote dark sky site.

For my talk, I will be providing both a travelogue of our journey through much of Alaska in the winter as well as some basic facts about the Northern Lights in case anyone isn't familiar with the phenomenon.

Oh and lots of pretty pictures of course too.

## Skyscrapers Official Merchandise

<https://www.bonfire.com/store/skyscrapers/>

<https://business.landsend.com/store/skyscrapersinc/>



# President's Message

by Linda Bergemann

As winter approaches, we are packing up and moving away from Seagrave Memorial Observatory for the next few months; we're moving south. Our monthly meetings for **December through March** will be held at the **North Scituate Community House, 546 West Greenville Road, North Scituate 02857.**

Our December meeting will be on the second **Saturday, December 14.** We will begin early, at 5 PM, with a **Holiday Potluck Dinner**, followed by our speaker, Steve Hubbard, at about 6 PM. Steve's presentation will be about his recent trip to Alaska to view aurora. Please bring your family and join us to celebrate the holidays! RSVP to Kathy Siok (kathys5@cox.net) if you plan to participate in the potluck dinner.

For January, February and March, meetings will be on the first Saturday of each month at the North Scituate Community House. The meeting start time for these months is currently under discussion; perhaps late afternoon instead of early evening. If you have any ideas or preferences on the

## Observing Events

### Open Nights at Seagrave\*

Dec. 7, 7-9 PM

Dec. 21, 7-9 PM

Dec. 28, 7-9 PM\* Members are encouraged to attend

meeting time, please email me your thoughts at lbergemann@aol.com.

Lastly, be advised that the portable rest room will be removed from the observatory property on December 4. It will return in

## New Member Welcome to Skyscrapers

Daniel Burche  
of North Providence

April, when we resume meetings at the observatory.

Wishing you a happy and healthy holiday season, Linda



## Cosmic Coffeehouse

*Informal astronomy chat room  
meets on the 15th of each month at 7:00pm*

- interactive ZOOM format
- current news
- featured speakers
- equipment reviews
- observing notes
- fun 'n games

To receive your invite, send request to [Astro-Geek@comcast.net](mailto:Astro-Geek@comcast.net)



## Skyscrapers Presentations on YouTube

Many of our recent monthly presentations on Zoom have been recorded and published, with permission, on the Skyscrapers YouTube channel. Go to the URL below to view recent presentations.

<https://www.youtube.com/c/SeagraveObservatorySkyscrapersInc>



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 **December 15** to Jim Hendrickson at hendrickson.jim@gmail.com.

### E-mail subscriptions

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

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# Skylights: December 2024

by Jim Hendrickson

We're moving towards the longest nights of the year, and with that come the earliest sunsets. The earliest occurs at 4:14pm on December 8, and although nights will continue to get longer until solstice on the 21st, the Sun will be present for slightly longer times in our afternoons.

Following an 18.5-day stay in the non-zodiacal constellation Ophiuchus, the Sun enters Sagittarius on the 17th.

Our season of winter begins at 4:20am on the 21st, when the Sun will be at its most southerly point on the ecliptic. We will experience our longest night, totaling 14 hours and 52 minutes.

In what is nothing more than a cosmic coincidence, the Sun crosses the galactic equator at 1:08pm on the 21st, just eight hours past solstice.

The **Moon** is new on the 1st, beginning Lunation 1261.

The 6-day waxing crescent Moon is 4.1° west-southwest of Saturn on the 7th. First Quarter is at 10:27am on the 8th, in Aquarius. Late that evening, the Moon is then 3.2° west of Neptune.

On the morning of the 13th, the waxing gibbous Moon is 3.4° north of Uranus, and later that evening, the 97.2% illuminated Moon is 2.5° east of the Pleiades cluster.

The Full Cold Moon occurs at 4:02am on the 15th. The closest moonrise is at 3:17pm on the 14th. The Moon transits at 11:28pm. Note its position near Elnath (beta Tauri), and that this is the most northerly full Moon of 2024, at 76.0° above the southern horizon. Jupiter is positioned prominently nearby throughout the evening. The Moon sets at 7:43am.

Later on the 15th, the Moon is 3.2° north of the open star cluster M35 in Gemini.

The waning gibbous Moon is 2.5° southwest of Pollux on the morning of the 17th, and has a very close 0.1° conjunction with Mars at 5:00am on the 18th.

Early in the morning of the 20th, the Moon is 1.6° north of Regulus.

Last quarter Moon occurs at 8:28pm on the 22nd, in Virgo.

On the morning of the 24th, the waning crescent Moon will be 3.9° west-northwest of Spica, in Virgo. On the 28th, the 6.4% illuminated crescent will be 1.4° west of Antares, and 0.1° southwest of the globular cluster M4, both in Scorpius. This will also appear 9.5° to the southwest (to the right

of) Mercury.

The 2.4% illuminated crescent Moon is 8.2° south-southeast (almost directly below) Mercury on the 29th.

The Moon is new at 5:27pm on the 30th, beginning Lunation 1262.

After having a relatively favorable evening appearance during the past month, **Mercury** is at inferior conjunction on the 5th, and returns to the morning sky for a very favorable apparition.

By the 11th, Mercury rises over an hour before sunrise, and by the 15th, 90 minutes.

Be sure to observe Mercury with a telescope to see its widening crescent phase. It is 50% illuminated on the 20th, and becomes gibbous thereafter.

Earliest Mercuryrise is at 5:22am on the 21st.

Mercury reaches greatest elongation at 22.0° west of the Sun on the 24th, and it rises a full hour and 45 minutes before sunrise.

Mercury is 8.2° northeast (directly to the left of) Antares on the 28nd.

**Venus** is the brightest starlike object in the evening sky this month. Beginning on the 1st, it will be visible for at least three hours after sunset.

One of the most beautiful sights in the sky, a pairing of the crescent Moon with Venus, occurs on the 4th, when the 13.8% illuminated Moon is just 2.6° south of the brilliant planet.

Although it will be a challenge to see, Pluto is 1.0° south of Venus on the 7th. What can be easily seen, however, is the globular cluster M75, which will be 0.8° northwest of Venus on the same evening.

Venus moves into Capricornus on the 6th.

On the 15th, Venus lies on a line extending through the western edge of the Summer Triangle, extending from Vega and through Altair.

Throughout December, Venus continues to gain apparent distance from the Sun, as well as elevation over the southwestern horizon.

During the second half of the month, Venus is visible after sunset in the south-southwest, almost as far south of west as it can possibly get. It is also getting noticeably higher in elevation with each passing night. Our "Evening Star" is with us for 3.5 hours, and through a telescope it

## Events in December

1	01:21	<b>New Moon</b> (Lunation 1261)
4	03:00	Mars 1.8° NW of M44
4	18:00	Moon 2.5° S of Venus
4	11:18	Saturn Quadrature (90°E)
5	21:18	Mercury Inferior Conjunction
6	18:00	Venus 0.8° SE of M75
7	22:00	Moon 4.1° WSW of Saturn
7	15:58	Jupiter Opposition
7	15:59	Mars Stationary
7	18:00	Venus 1.0° NNW of Pluto
8	06:05	Neptune Stationary
8	10:27	<b>First Quarter Moon</b>
8	16:14	Earliest Sunset
8	23:00	Moon 3.2° W of Neptune
13	20:00	Geminid Meteor Shower
13	04:00	Moon 3.4° N of Uranus
13	12:00	15 Eunomia Opposition (mag 8.1)
13	17:00	Moon 2.5° E of M45
14	17:00	Moon 5.2° NW of Jupiter
14	23:28	Most Northerly Full Moon Transit (75 58')
15	04:02	<b>Full Cold Moon</b>
15	16:14	Mercury Stationary
15	03:00	Moon 0.5° S of Elnath
15	18:00	Moon 3.2° N of M35
17	06:00	Moon 2.5° SW of Pollux
17	20:00	Sun in Sagittarius
18	05:00	Moon 0.1° N of Mars
18	09:29	Neptune Quadrature (90°E)
20	02:00	Moon 1.6° N of Regulus
21	04:20	<b>Solstice</b>
21	05:22	Earliest Mercuryrise
21	13:08	Sun at 0° Galactic Latitude
22	20:28	<b>Last Quarter Moon</b>
24		Equation of Time = 0
24	06:00	Moon 3.9° WNW of Spica
24	21:00	Mercury Greatest Elongation (22.0°W)
28	06:00	Moon 1.4° W of Antares (0.1° SW of M4)
30	17:27	<b>New Moon</b> (Lunation 1262)

Ephemeris times are in EST (UTC-5) for Seagrave Observatory (41.845N, 71.590W)

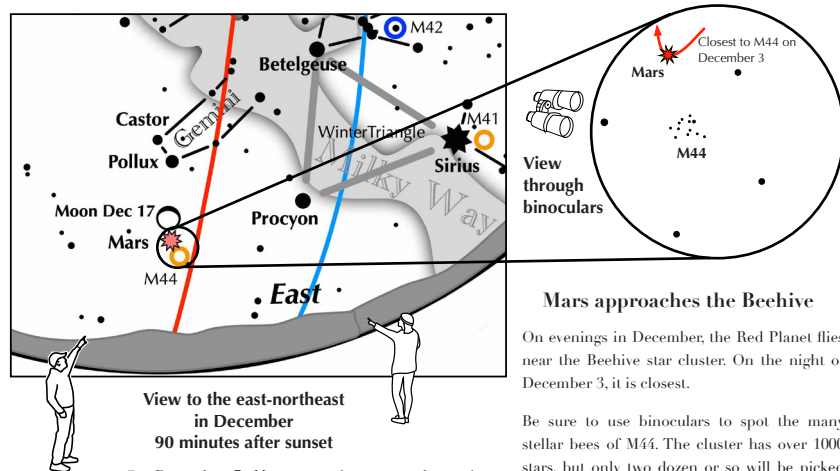
shows a distinctly flattened gibbous phase, as it makes its way towards half-illumination next month.

Venus crosses the line connecting Altair and Fomalhaut on the 26th. Note also how it is getting closer to Saturn.

By the end of December, Venus shines at a brilliant magnitude -4.4.

**Mars** rises at 10:00pm in early December and reaches its stationary point on the 7th. As such, the Red Planet makes a nice pairing with M44, the Beehive Cluster, for the next several days, lying within 2° of the cluster, making for a fine sight in binoculars

## On a moonless evening in December, try this challenge:

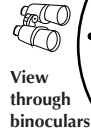


View to the east-northeast  
in December  
90 minutes after sunset

On December 7, Mars starts its retrograde motion, moving slightly each evening westward until February.

Even though Mars and M44 lie near each other in binoculars, they are nowhere near each other in three-dimensional space. M44 is 50 million times farther than the Mars!

It has taken the light from M44's stars over 575 years to reach your eyes!



View through binoculars

### Mars approaches the Beehive

On evenings in December, the Red Planet flies near the Beehive star cluster. On the night of December 3, it is closest.

Be sure to use binoculars to spot the many stellar bees of M44. The cluster has over 1000 stars, but only two dozen or so will be picked out with binoculars.



and rich field telescopes.

From the second week of December onward, soon after Mars rises, you can also see four naked-eye planets in the sky simultaneously, starting from Venus low in the southwest, Saturn high in the southwest, Jupiter high in the southeast, and Mars. With Neptune and Uranus also visible telescopically, all of the planets except Mercury are visible at this time.

The Red Planet continues to brighten as we get closer to it, reaching -1.0 on the 21st.

The waning gibbous Moon is close to Mars on the 17th-18th, passing within just 0.1° north of it at 5:00am.

On the 25th it lies along the line extending from Sirius through Procyon, and is still located within a few degrees of the Beehive cluster, M44.

**Jupiter** reaches opposition on the 7th. The giant planet will be at its largest and brightest during this week, peaking at magnitude -2.8 and its fully-illuminated globe shows a diameter of 48.3 arcseconds. Of all the planets, only Venus can appear larger and brighter in our sky.

It is notable that in the days closest to Jupiter's opposition, the shadows of the Galilean moons appear very close to the transiting moons themselves, and moons passing behind the planet will pass into shadow rather close to the limb of the planet itself.

Some examples of this can be seen at 10:12pm on the 5th, when a transit of Europa's shadow begins; at 4:27am on the 7th, when Io and its shadow transit nearly simultaneously; at 6:52pm on the 7th, when

Europa emerges from eclipse; and 4:00am on the 8th, when Io emerges from the eclipse. Watch the moons on subsequent nights to see the shadow offset increase.

At 2:18am on the 23rd, Io and Ganymede are both located very close – within 1 arcsecond – to Jupiter's eastern and southwestern limb, respectively. This is a good test of your telescope's resolving power, as well as atmospheric seeing conditions. Also, Ganymede's shadow will be transiting the planet.

An east-to-west alignment of the four Galilean moons in order of their orbital radius occurs after 10:30pm on the 23rd.

**Saturn** reaches its point of eastern quadrature on the 4th, indicating that the season to observe it is about  $\frac{3}{4}$  over. Saturn is now setting before 11:30pm, and is still situated on a line running through the western edge of the Great Square of Pegasus and extending south to Fomalhaut.

From mid-December, Saturn becomes noticeably west of the meridian after twilight, meaning we only have a few hours to view it in the evening sky.

On the 23rd, note the diamond formed by Venus in the west, Saturn, Diphda (beta Ceti) towards the east, and Fomalhaut in the south. Each segment of the diamond is approximately 26° in length. The diamond becomes distorted as Venus approaches Saturn.

The ring plane angle continues to narrow, closing from 6.2° in early December to 5.3° at the end of the month.

**Uranus** is in western Taurus, and well-

placed for observing all night in December. From the Pleiades cluster, locate a pair of 6th magnitude stars, 14 and 13 Tauri, about 4° to the south. Uranus is situated southwest of these stars; its distance ranges from 3.6° to 4.5° through December.

You can also locate it near the magnitude 6.5 star HD 21335. In early December, Uranus is 0.2° southeast of the star, and at the end of the month, it ranges to 0.7° southwest of this star.

Given that Uranus is still at its best viewing of the year, this is a good opportunity to locate its largest moons. With a sufficiently large telescope (12-inches or greater), or photographically, given a tracking mount and relatively long focal length, Titania and Oberon, which shine at magnitudes 13.8 and 14.0, and extend as far as 30 and 40 arcseconds from the planet, respectively, can be challenging, yet rewarding to hunt for.

**Neptune**, in Pisces, is stationary on the 8th, and resumes its prograde (eastward) motion. At magnitude 7.7, it is 4.7° south-southwest of lambda Piscium, the southwesternmost star in the Cirlet asterism, and 0.7° east-northeast of 20 Piscium.

Neptune reaches its point of eastern quadrature (90° east of the Sun) on the 18th. You will find it due south at the end of evening twilight,

Neptune sets at 11:15pm.

**Ceres** is low in the southwest, shining at magnitude 9.2 in eastern Sagittarius. At the beginning of the month, it is just east of 62 Sagittarii, in the Herman's Cross asterism.

In early December, **Pluto** is located less than 5° to the northeast of Ceres, and 1.8° south-southwest of globular cluster M75. At magnitude 14.5, Pluto is becoming difficult to observe as it sinks lower in the southwest after sunset.

Both dwarf planets will be too low in the southwest to be viewed later in the month.

Asteroid **4 Vesta** shines at 8th magnitude and is moving eastward through Virgo. It is within 3.3° south-southwest of Heze (zeta Virginis) from the 14th-16th.

Comet **C/2023 A3 Tsuchinshan-ATLAS** is best viewed in early December, as bright moonlight will not interfere with observing the fading comet, estimated to be around 8th magnitude. It is moving eastward in Aquila as it gains distance. Its long tail is a distant memory, but the comet's nucleus and coma may still be observed in binoculars and small telescopes.

On the 1st, it passes between the open clusters NGC 6755 and NGC 6756. On the

7th, the comet is within  $0.5^\circ$  south of 22 Aquilae, and is now over 1.5 au from Earth. It is about  $2.0^\circ$  south of the planetary nebula NGC 6781 on the 9th, and  $2.0^\circ$  north of delta Aquilae on the 13th-14th.

A lesser known asteroid is visible in our evening sky. **15 Eunomia** reaches opposition on the 13th. It is 1.3 au away and shines at magnitude 8.1. It can be found in Auriga,  $5.0^\circ$  north of Elnath, and within the same binocular field of view as the open clusters M36 and M38.



On the 17th-19th, it can be seen near 16 Aurigae, in the Leaping Minnow asterism,  $5.0^\circ$  north-northwest of Elnath and  $3.6^\circ$  east of Hassaleh (iota Aurigae).

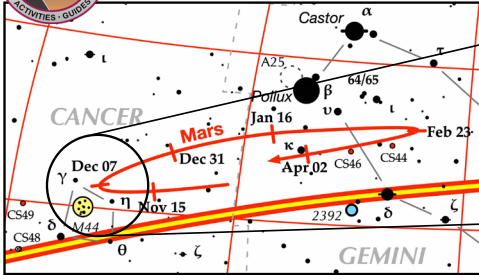
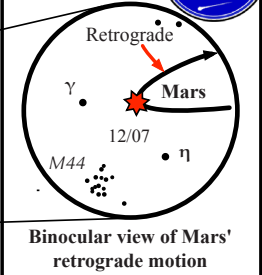
The **Geminids**, typically one of the year's best-performing meteor showers, is active all week, and peaks on the 12th-13th. At peak, this shower, which consists of particles from asteroid 3200 Phaethon and appears to originate from a point  $2^\circ$  east of Castor, can produce 100 meteors per hour, however, the nearly full Moon will interfere with viewing the 2024 show.

The **Ursids**, a low rate yet fairly reliable shower, peaks on the 21st-22nd. About 5-10 meteors per hour may be seen originating from the circumpolar constellation Ursa Minor. The 56.6% gibbous Moon rises at 11:02pm.




## Observing Project: Retrograde Motion of Mars

*See this for yourself!*

**Relative apparent size of Mars**

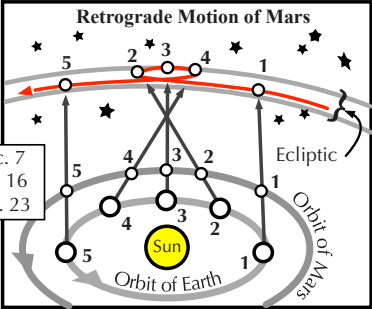
-  94% illuminated  
Dec. 7, 2024  
Magnitude: -0.6  
Diameter: 12 seconds  
Distance: 71 million miles
-  100% illuminated  
Opposition  
Jan. 16, 2025  
Magnitude: -1.4  
Diameter: 15 seconds  
Distance: 60 million miles
-  94% illuminated  
Feb. 23, 2025  
Magnitude: -0.4  
Diameter: 11 seconds  
Distance: 76 million miles

Over the next four months, observe Mars using binoculars on every clear night, then plot its changing position among the background stars.

Mars nears M44, the Beehive star cluster, in central Cancer in early December. It reaches its closest point to it on December 7, after which it enters retrograde motion, inching westward each evening until February 23, 2025. Mars then lies in central Gemini.

Mars will also be growing in angular size as Earth slowly overtakes it on January 16, 2025. (Actually, the two planets are closest on January 11. The discrepancy is due to Mars' elliptical orbit.) At this time, it shows its largest angular size – 15 arc seconds – until April 2031. By February 23, the Red Planet ceases moving westward nightly, shifting its direction eastward (called prograde motion).

**Mars at its brightest, largest & closest:**  
Jan. 11, 2025  
-1.4 mag., 15 arc seconds, 59.8 million miles  
It won't come any closer until Apr 11, 2031.



**Retrograde Motion of Mars**

2: Dec. 7  
3: Jan. 16  
4: Feb. 23

**Why do this activity?** This planetary dance can only be explained if both Earth and Mars orbit our sun following definable elliptical paths. Our view from Earth clearly shows this to those people who take the time to look carefully enough.

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## December Night Sky Notes: Spot the King of Planets

by Dave Prosper, updated by Kat Troche

Jupiter is our solar system's undisputed king of the planets! Jupiter is bright and easy to spot from our vantage point on Earth, helped by its massive size and banded, reflective cloud tops. Jupiter even possesses moons the size of planets: Ganymede, its largest, is bigger than the planet Mercury. What's more, you can easily observe Jupiter and its moons with a modest instrument, just like Galileo did over 400 years ago.

Jupiter's position as our solar system's largest planet is truly earned; you could fit 11 Earths along Jupiter's diameter, and

in case you were looking to fill up Jupiter with some Earth-size marbles, you would need over 1300 Earths to fill it up – and that would still not be quite enough! However, despite its formidable size, Jupiter's true rule over the outer solar system comes from its enormous mass. If you took all of the planets in our solar system and put them together, they would still only be half as massive as Jupiter all by itself. Jupiter's mighty mass has shaped the orbits of countless comets and asteroids. Its gravity can fling these tiny objects towards our inner

solar system and also draw them into itself, as famously observed in 1994 when Comet Shoemaker-Levy 9, drawn towards Jupiter in previous orbits, smashed into the gas giant's atmosphere. Its multiple fragments slammed into Jupiter's cloud tops with such violence that the fireballs and dark impact spots were not only seen by NASA's orbiting Galileo probe but also by observers back on Earth!

Jupiter is easy to observe at night with our unaided eyes, as well-documented by the ancient astronomers who carefully re-

corded its slow movements from night to night. It can be one of the brightest objects in our nighttime skies, bested only by the Moon, Venus, and occasionally Mars, when the red planet is at opposition. That's impressive for a planet that, at its closest to Earth, is still over 365 million miles (587 million km) away. It's even more impressive that the giant world remains very bright to Earthbound observers at its furthest distance: 600 million miles (968 million km)! While the King of Planets has a coterie of 95 known moons, only the four large moons that Galileo originally observed in 1610 – Io, Europa, Ganymede, and Callisto – can be easily observed by Earth-based observers with very modest equipment. These are called, appropriately enough, the Galilean moons. Most telescopes will show the moons as faint star-like objects neatly lined up close to bright Jupiter. Most binoculars will show at least one or two moons orbiting the planet. Small telescopes will show all four of the Galilean moons if they are all visible, but sometimes they can pass behind or in front of Jupiter or even each other. Telescopes will also show details like Jupiter's cloud bands and, if powerful enough, large storms like its famous Great Red Spot, and the shadows of the Galilean moons passing between the Sun and Jupiter. Sketching the positions of Jupiter's moons



NASA's Juno mission captured this look at the southern hemisphere of Jupiter on Feb. 17, 2020, during one of the spacecraft's close approaches to the giant planet. This high-resolution view is a composite of four images captured by the JunoCam imager and assembled by citizen scientist Kevin M. Gill. Credit: NASA, JPL-Caltech, SwRI, MSSS | Image processing by Kevin M. Gill, © CC BY

during the course of an evening – and night to night – can be a rewarding project! You can download an activity guide from the Astronomical Society of the Pacific at [bit.ly/drawjupitermoons](https://bit.ly/drawjupitermoons)

Now in its eighth year, NASA's Juno mission is one of just nine spacecraft to have visited this impressive world. Juno entered Jupiter's orbit in 2016 to begin its initial

mission to study this giant world's mysterious interior. The years have proven Juno's mission a success, with data from the probe revolutionizing our understanding of this gassy world's guts. Juno's mission has since been extended to include the study of its large moons, and since 2021 the plucky probe, increasingly battered by Jupiter's powerful radiation belts, has made close flybys of the icy moons Ganymede and Europa, along with volcanic Io. What else will we potentially learn in 2030 with the Europa Clipper mission?

Find the latest discoveries from Juno and NASA's missions to Jupiter at [science.nasa.gov/jupiter/](https://science.nasa.gov/jupiter/)

*Originally posted by Dave Prosser: February 2023. Last Updated by Kat Troche: November 2024.*

This article is distributed by NASA's Night Sky Network (NSN). The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!



Look for Jupiter near the Eye of the Bull, Aldebaran, in the Taurus constellation on the evening of December 15, 2024. Binoculars may help you spot Jupiter's moons as small bright star-like objects on either side of the planet. A small telescope will show them easily, along with Jupiter's famed cloud bands. How many can you count? Credit: Stellarium Web

## Observer's Challenge:

# Deer Lick Group: Galaxy Cluster near NGC 7331 in Pegasus

by Glenn Chaple

NGC 7331 (Magnitude 9.5, Size 10.5' X 3.5'); NGC 7335 (Magnitude 13.3, Size 1.2' X 0.5'); NGC 7336 (Magnitude 14.5, Size 0.8' X 0.4'); NGC 7337 (Magnitude 14.4, Size 1.0' X 0.8'); NGC 7340 (Magnitude 13.7, Size 0.9' X 0.6')

To capture this month's Observer's Challenge, we need to travel to the northwest corner of Pegasus and the galaxy NGC 7331. We might consider this spiral a "Messier Miss," for it's brighter (magnitude 9.5) than a number of galaxies the French comet hunter included in his Catalog of cometary imposters. Credit for its discovery goes to William Herschel, who came upon it in 1784.

The good news is that NGC 7331 is bright enough to be seen with the smallest of telescopes. The bad news is NGC 7331 isn't our challenge. That comes instead from a quartet of small and faint galaxies located just to its east. The four, NGC 7335, NGC 7336, NGC 7337, and NGC 7340 are known collectively as the Deer Lick Group, nicknamed in the 1980s by amateur astronomer Tom Lorenzin who viewed them from the Deerlick Gap Overlook in the North Carolina mountains. Their small size (all have dimensions of around one arc-minute or less) may have been the inspiration for a second nick-name, the Fleas.

The Deer Lick Galaxy Group offers one challenge for the visual observer. Can you even see it? In his book *Cosmic Challenge*, author Philip Harrington considers it a test for medium-sized (6- to 9.25-inch) telescopes. In areas with even a slight amount of light pollution, you may need twice that aperture for even an averted vision glimpse. At visual magnitude 13.3, NGC 7335 is the brightest member of the group. It was discovered by Herschel a week after he found NGC 7331. The mid-13th magnitude NGC 7340 and the mid-14th magnitude NGC 7336 and NGC 7337 would remain unseen for 65 years until spotted by William Parsons, the 3rd Earl of Rosse, and his assistant George Stoney using the "leviathan" 72-inch reflecting telescope at Birr Castle.

Don't despair if the Deer Lick Galaxy Group is beyond your telescopic reach. NGC 7331 is a worthy "consolation

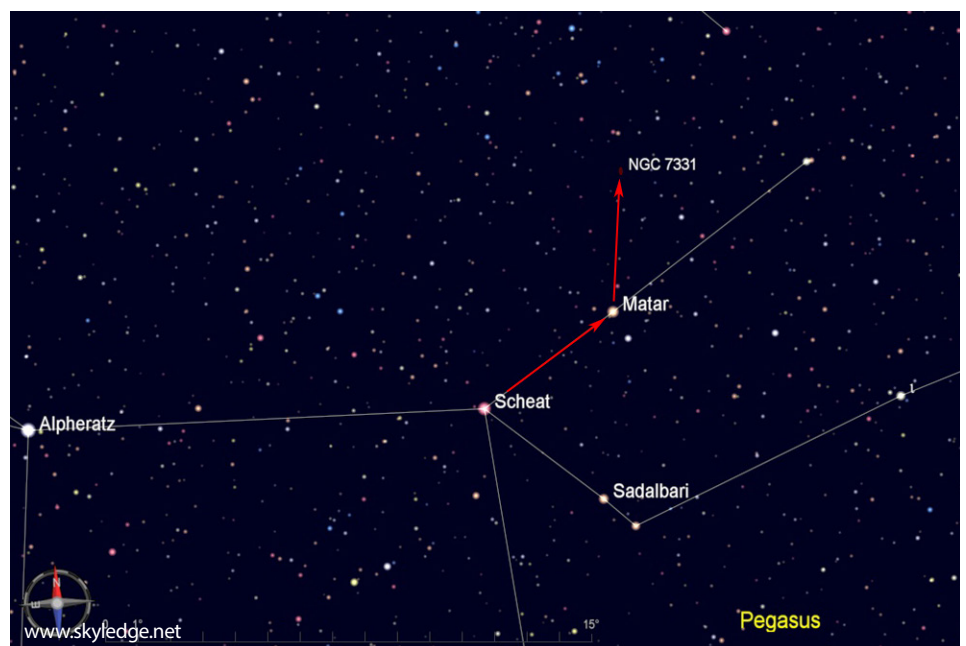
prize." Located at 2000.0 coordinates RA 22h37m04.1s and DEC +34o24'56", it's about a 4 degree star-hop north and slightly west of the 3rd magnitude star Matar (eta (η) Pegasi). This steeply inclined spiral is as large, if not slightly larger than our own Milky Way. Its appearance visually and es-

pecially photographically earned it a place (number 30) on Sir Patrick Moore's Caldwell Catalog.

The distance to NGC 7331 has been variously listed as around 40 to 50 million light-years. The Fleas have distances estimated at between 290 and 370 million light-years.



This image was taken with my 32 inch F6 telescope, with a ZWO 6200 camera and RGB filters. Processed in PixInsight. Mario Motta



# Frank Evans Seagrave

## A Timeline of His Life & Contributions in Historical Context

by David A. Huestis

### ~ Part II: 1900 - 1910 ~

Frank Evans Seagrave continued his astronomical endeavors as the beginning of the 20th century approached. Throughout the next 34 years his prolific observations and calculations were submitted to many of the astronomical journals of the time. Part II (1900 – 1910) will highlight a few of his achievements in historical context.

I wish to remind the reader that an Excel spreadsheet posted on our [Google Drive](#) can be used to access the SAO/NASA Astrophysics Data System (ADS) database.

There one can retrieve Seagrave contributions. I'm sure a few have been missed, but I believe the ones uncovered are representative of his work.

Instructions on how to retrieve the specific volumes can be found here: [ADS](#).

From this point forward, when you encounter [Google Drive](#), click on it and you will be transferred to our Google Drive where you can view additional material.

In following timeline, Seagrave specific material is presented in **bold blue text**.

Also, when you see this symbol 🔍 it means you can bring up the journals spreadsheet. Select the Biblio-code of a journal entry you wish to view and copy and paste that into the ADS database to access the details.

Throughout the time period covered by this Part II article, Seagrave corresponded frequently with E.C Pickering of Harvard. I have posted a few of those letters on our [Google Drive](#).

### 1900 Historical Highlights

#### Frank: 40 Years-Old

- ◆ The Eastman Kodak Company releases the Brownie camera on February 1, revolutionizing photography for the masses.
- ◆ Bayer aspirin in tablet form, first produced in Germany in 1899, receives a United States patent in February 27, 1900.
- ◆ Work on New York City's subway begins on March 24.
- ◆ On April 30, Hawaii becomes an official US territory.
- ◆ On May 18, Frank Baum publishes his children's book, *The Wonderful Wizard of Oz*, leaving us many memorable quotes like, "There is no place like home."; "Toto, I've got a feeling we're not in Kansas anymore."; and "Pay no attention to that man behind the curtain."
- ◆ On July 2, an experimental airship (dirigible) takes off in Germany. This is the brainchild of Ferdinand von Zeppelin. This 420 foot long airship reaches an altitude of 1350 feet and flew 3.7 miles. This airship uses a rigid infrastructure was a metal framework that encloses gasbags.
- ◆ The Great Galveston Hurricane, a category 4 storm, makes landfall on September 8, near Galveston, Texas. The city is leveled, leaving an estimated 6,000 to 12,000 dead (8,000 fatalities is the number usually quoted) in the region.
- ◆ Wilbur and Orville Wright test a biplane glider at Kitty Hawk in North Carolina during early autumn. This "vehicle" is really nothing more than a "double-decker" hang-glider, stabilized by men holding ropes as it rises above the ground due to "lift" created by the wind across the wings surfaces.
- ◆ October 19: German physicist Max Planck proposes the revolutionary concept of the quantum theory
- ◆ On November 6, William McKinley wins a second term as president of the United States. He ran on the platform of "the full dinner pail."
- ◆ Sigmund Freud publishes *The Interpretation of Dreams* on

November 4, 1899, but dated 1890.

**Frank, his mom Mary, and C.A.R. Lundlin (chief optician for Alvan Clark & Sons) travel to Southern Pines, North Carolina for the May 28 total solar eclipse. Lundlin had been on the 1878 Harvard expedition to Fort Worth Texas. Lundlin takes photos of the corona during totality using a 4-inch photographic telescope of about 5.5 foot focal length. Seagrave uses a 2-inch and 3-inch telescope for observations. Once again he uses the Victor Kullberg chromometer to record precise timings of first thru last contact. Totality lasts 1 minute and 34 seconds. Mary observes shadow bands from 3 to 6 minutes before totality.** 🔍

### 1901 Historical Highlights

- ◆ After being reelected to the presidency on November 6, 1900, William McKinley begins a second term on March 4.
- ◆ In December, a black basalt stele containing a cuneiform text is found in what is now Iran by French archeologist Jacques de Morgan. It reveals 282 laws written in cuneiform by Babylonian king Hammurabi between 1755 and 1750 BCE.
- ◆ Queen Victoria of the United Kingdom dies on January 22 after serving 63 years and 216 days on the throne. Her son Edward the VII succeeds her.
- ◆ Beatrix Potter privately publishes *The Tale of Peter Rabbit*.
- ◆ On August 6, Robert Falcon Scott begins his expedition (known as Discovery) from England to Antarctica. Once reaching the continent, treks to within about 530 miles of the South Pole. Returns home in September 1904.
- ◆ President McKinley is shot twice at the Pan-American exhibition in Buffalo, New York. He dies on September 14 from his wounds. Vice President Theodore Roosevelt becomes presi-



dent.

- ◆ On December 12, atop Signal Hill in St John's in Newfoundland, Canada, Guglielmo Marconi receives a radio message in Morse code transmitted from Poldhu in Cornwall, England, about 2,200 miles away.
- ◆ The Eastman Kodak Company introduces the 120 film format for the Brownie 2 camera that was introduced in 1901.
- ◆ H.G. Wells' classic science fiction work, "The First Men in the Moon," is published in hardcover. "Poor Cavor! He did have such a terrible cold."
- ◆ Annie Jump Cannon, while working under Director E.C. Pickering of Harvard College Observatory, revises a stellar classification system based upon a star's spectra, indicating temperature. The lettering scheme is: O (hottest), B, A, F, G, K, M (coolest). Our Sun is a G2 type star.

Frank Seagrave begins observing the newly discovered Nova Persei with a two-inch telescope on February 23. He also views it with a Browning direct vision three prism spectroscope. Nova Persei is a classical nova – a binary star system in which the white dwarf companion accretes material from the main sequence primary. 🔍

Seagrave also contributes double-star observations this year. 🔍

## 1902 Historical Highlights

- ◆ July 17: Willis Haviland Carrier of New York state invents the first electrical air conditioner.
- ◆ French film director George Melies produces a short film, A Trip to the Moon, incorporating special effects. It is released on September 1. See the full movie here: [https://www.google.com/search?sca\\_esv=d017e8b6c7d64dcd&rlz=1CISQ-JL\\_enUS805US805&tbn=vid&source=lnms&prm-d=visnbtmz&sa=X&ved=2ahUKewj69eqD4peGAXV-GEVkJFHd0oDWMQ0pQJegQIERAB&q=watch%20a%20trip%20to%20the%20moon&biw=1694&bih=945&dpr=1#fp-state=ive&vld=cid:89714a20,vid:xLVChRVfZ74,st:0](https://www.google.com/search?sca_esv=d017e8b6c7d64dcd&rlz=1CISQ-JL_enUS805US805&tbn=vid&source=lnms&prm-d=visnbtmz&sa=X&ved=2ahUKewj69eqD4peGAXV-GEVkJFHd0oDWMQ0pQJegQIERAB&q=watch%20a%20trip%20to%20the%20moon&biw=1694&bih=945&dpr=1#fp-state=ive&vld=cid:89714a20,vid:xLVChRVfZ74,st:0)
- ◆ In November, President Theodore Roosevelt, known as "Teddy," is on a bear hunting trip in Mississippi. Other members of the hunting party had already succeeded in bagging a bear, while the President had not. His handlers capture and tied a black bear to a tree and suggest the President shoot it. Roosevelt refuse, saying it was unsportsmanlike. Well, the incident became political fodder. Brooklyn shopkeepers Morris and Rose Michtom were somehow inspired by the story and soon thereafter create the "Teddy Bear." Initially they were hand sewn by Rose. In 1903 they open a production factory and had much success.

Seagrave contributes many observations to the astronomical journals on a variety of topics during 1902, including Nova Persei, the Leonid meteor shower, and the equatorial diameter of Saturn. There is a great paper where Seagrave comments on an interesting theory that thunderstorms can be linked to the Moon's phases. He also supplies ephemeris on Comet 1895 Swift II and the asteroid Eros. As for the comet, an orbital period of just over 7 years is calculated, but the comet is never seen again. 🔍

One primary focus is on his ephemeris for Comet 1902b Perrine. This comet is discovered by Lick Observatory astronomer Charles Dillon Perrine on September 1, 1902, using a 12-inch Clark refractor. Seagrave provides many ephemerides for this comet. These calculations show that the comet will pass within about two-million miles of Mercury on November 29-30. They also reveal that this is the comet's first visit to the inner solar system, and that due to its parabolic orbit will never return. 🔍

## 1903 Historical Highlights

- ◆ January 18, 1903 - The first public two-way wireless communication between Europe and the United States is achieved by Guglielmo Marconi when he transmits a message from a telegraph station in South Wellfleet, Massachusetts from President Theodore Roosevelt to the King of England using Morse Code. Simultaneously a message from the King of England is likewise transmitted from Poldu, England to the President. Messages received by both parties.
- ◆ The novel, *Call of the Wild*, is published by American author Jack London. Set in 1897, it tells the story of a dog named Buck who experiences many adventures as a sled dog in Canada's Yukon during the Klondike Gold Rush (1896 - 1899.)
- ◆ April 23-30: At a conference in Madrid, Spain, Ivan Pavlov, Russian neurologist and physiologist, presents a paper on his conditioned reflex experiments with dogs. Pavlov had set up an experiment in which he rings a bell shortly before presenting food to the dogs. At first, the dogs do not respond to the bell. However, eventually, the dogs begin to salivate at the sound of the bell alone.
- ◆ May 23 - July 26: The first cross-country road trip by car in the United States from San Francisco to New York City. The total of about 5,500 miles is driven in a 1903 Winton touring car. Took about 50 days of actual driving.
- ◆ On October 1 – 13, the first World Series baseball games are played. In the best of nine series, the Boston Americans beat the Pittsburgh Pirates five games to three.
- ◆ The 12 minute silent short film, The Great Train Robbery, is released on December 1, by the Edison Manufacturing Company. It is quite successful.
- ◆ December 17, at Kill Devil Hills, North Carolina, Orville and Wilbur Wright successfully fly their Wright Flyer, a twin propeller gas powered engine, 120 feet in 12 seconds with Orville at the controls. It flies only about 10 feet above the ground.
- ◆ In papers published in 1903, Ernest Rutherford and Frederick Soddy identify the process of radioactive half-life: initially defined as the amount of time required for a radioactive substance to decay into other elements.

Seagrave continues to provide observations of Nova Persei. Comet computations are a specialty of his. He provides search ephemeris for the return of Comet Brooks 1889 V and Comet Faye, and continues to supply ephemerides for both during the year for astronomers to locate them. E.C. Pickering of HCO uses Seagrave's ephemeris for the opposition of Eros in 1904-1905. 🔍

Seagrave reports on his continued measurement of Saturn's rings. In 1851 and 1852, Russian astronomer Otto von Struve's research of Saturn's rings allegedly indicated

the distance between the planet's disc and the bright B ring was decreasing very rapidly. In fact, von Struve predicted that the rings would crash down on the planet's "surface" by the year 2150. In 1901 and 1902, Frank made micrometer measurements of the planet and its rings. Seagrave noted no decrease. (Later in 1914 and 1915 Seagrave makes the same measurements. No change is detected.) 🔍

Seagrave contributes 981 variable star estimates to E.C. Pickering of Harvard College Observatory for the year ending September 1902. 🔍

Then before year-end 1903, some event occurred in Seagrave's life that changed everything for a few years.

Besides contributing to the various astronomical journals of the day, Seagrave submitted observations and ephemerides to Professor E.C. Pickering, Director of Harvard College Observatory. Back in 1984 I was granted permission to visit the Harvard University Archives to research the correspondence collection of Pickering. There I found a wealth of information.

I was able to enlist the staff to make copies of letters between Seagrave and Pickering. Unfortunately, quite a few of the copies had the date truncated.

Despite that setback, I do have a small sample that I have scanned and have made available on our ([Google Drive](#)). As I recall, I could only request a limited number of copies. I did come across a very curious letter from Seagrave to Pickering dated October 19, 1903. A transcription of it follows:

*Prof. E.C. Pickering,  
Dear Sir.*

*Do you know of anybody that would like to buy an 8-inch equatorial telescope? I would like to sell mine if I could get a reasonable price for it. I thought that I would write to you before placing it in A. Clarke & Sons hands to sell. The telescope has clock work, micrometer, two sets of eyepieces, etc.*

*Yours etc,  
E.E. Seagrave*

On November 2, 1903 Pickering responds:

*Dear Mr. Seagrave,*

*I regret that I know of no one who wants an 8-inch telescope, and can think of no better course to follow than to communicate with the Clarks, unless possibly to advertise in Popular Astronomy.*

*Very sincerely yours,  
E.C. Pickering*

What prompted Seagrave to offer his beloved Clark telescope for sale? We may never know the reason, but as I examine the next few years in the timeline it is quite apparent that whatever it was had a big impact on Seagrave's

astronomical contributions.

## 1904 Historical Highlights

- ◆ The United States assumes construction of the Panama Canal on May 4. This 51 mile long shortcut across the Isthmus of Panama connects the Atlantic and Pacific Oceans. Ships no longer had to sail around the Straits of Magellan (Cape Horn) at the tip of South America, saving 5 months of travel time. Completed on April 15, 1914.
- ◆ On May 5, 1904, Boston Americans pitcher Cy Young, pitches the first perfect game against the Philadelphia Athletics.
- ◆ On June 10, Max Wolf of Heidelberg discovers main belt asteroid 522 Helga.
- ◆ On June 13, the Mount Wilson Observatory is founded by George Ellery Hale with the leasing of a site in the San Gabriel Mountains just outside of Pasadena, California. The location is selected for solar observing due to the steady atmosphere at the 5,710 summit. The first telescope installed there is the Snow Solar Telescope built at Yerkes Observatory in Wisconsin and transported to Mount Wilson. It is hauled up the mountain, set up in January 1905, and experiences first "sun" light" on March 15, 1905.
- ◆ On June 21, another milestone transportation project is completed: the Trans-Siberian Railway. June or July 21. I've seen both months. Construction began on March 9, 1891. Stretches 5,772 miles from Moscow to Vladivostok
- ◆ English astronomer Edward Maunder, a sunspot observer, notices that when a new solar cycle begins, groups of spots form at higher solar latitudes. As the cycle progresses from maximum to minimum – 11 years on average, formation of the spot groups migrate towards lower latitudes and the solar equator. When the next cycle begins the process begins all over again. When plotted, the Butterfly Diagram results.
- ◆ On November 8 Theodore Roosevelt wins the US presidential election. This would be a second term, after having served as president for three years after the shooting of (September 6, 1901) and death of (September 14, 1901) William McKinley.
- ◆ December 3, the sixth moon of Jupiter, Himalia, is discovered photographically using the 36-inch Crossley reflector at Lick Observatory by Charles Perrine. Jupiter's fifth moon, Amalthea, was discovered visually by E.E. Barnard on September 9, 1892, also using Lick's 36-inch reflector.

Seagrave provides search ephemeris thru January for the return of Encke's Comet for its 1904-1905 visit to the inner solar system. He provides further observations of Nova Persei from February 20 thru April 20. He also provides a report on his observations of variable star U Orionis from December 31, 1901 thru May 13, 1903. 🔍

However, for some unknown reason Seagrave is only referenced eight times in the journals of 1904. This trend continues for a few years.

## 1905 Historical Highlights

- ◆ January 5: the seventh moon of Jupiter, Elara, is discovered photographically using the 36-inch Crossley reflector at Lick Observatory by Charles Perrine.
- ◆ On March 4, President Theodore Roosevelt's is inaugurated for the second time.
- ◆ Percival Lowell, astronomer and mathematician, begins his

search for a ninth planet that he called “Planet X.” Based upon the orbital perturbations of both Uranus and Neptune, calculations suggest specific areas of the sky for photographic searches. From atop Mars Hill in Flagstaff, Arizona, the first search project continues until 1910 with no success.

- ◆ Albert Einstein has a good year in 1905. He publishes two very important papers (among others). On September 26 his special theory of relativity; and on November 2 his famous matter-equivalence formula theory:  $E = mc^2$

**Seagrave’s absence from the astronomical journals for 1905 and 1906 is a mystery, especially considering his contributions in prior years. More detective work is required on my part.**

## 1906 Historical Highlights

- ◆ Based upon stellar spectroscopic observations at Harvard College Observatory and his own studies in star classifications, Danish astronomer Ejnar Hertzsprung reveals there is a correlation between a star’s color (temperature) and its absolute magnitude (its brightness if were at a distance of 10 parsecs, 32.6 light-years.) When this data is plotted on a scatter graph, it shows what we now call main sequence stars (like the Sun.) See historical highlights for 1911 when Hertzsprung publishes this diagram. (Henry Norris Russell is separately working on this research, and in 1913 the H-R (Hertzsprung-Russell) Diagram is created.
- ◆ On a journey begun in 1903, Roald Amundsen and a crew of six men set out to navigate Canada’s Northwest Passage in a 47 ton, 70 foot by 20 foot sloop. On August 17, 1906, the expedition is a success. Boat was named *Gjøa*.
- ◆ On April 18, the San Francisco earthquake occurs as the land slips north and south along the San Andreas fault line by about 20 feet! The resulting 7.9 estimated magnitude event kills more than 3,000 people, and fires destroy much of the city.
- ◆ June 8: President Theodore Roosevelt signs another important act into law, the Antiquities Act. This law is enacted to protect Native American cultural sites, as well as to protect the vast lands and natural resources west of the Mississippi. Roosevelt uses this act to expand the National Parks System.
- ◆ June 30: Roosevelt signs the Pure Food and Drug Act. Its purpose is to prevent the “manufacture, sale, or transportation of adulterated or misbranded or poisonous or deleterious food, drugs, medications, and liquors...” It went into effect on January 1, 1907.
- ◆ President Theodore Roosevelt signs into law a revised Naturalization Act on June 29 and implemented on September 27. It provides new rules and requirements for becoming an Untied States citizen.
- ◆ December 14: Charles Pathé , a French film pioneer, opens one of the earliest luxury cinemas in Paris called The Omnia-Pathé Cinema. Seating capacity is 250 seats.
- ◆ Percival Lowell publishes *Mars and its Canals* in December. This work explores the features of Mars Lowell observed through his telescope in Flagstaff, Arizona. Particularly interesting is his speculations on the Martian “canals,” their purpose and construction. His first book, *Mars*, was published back in 1895.

**While Frank is reading a German magazine, he comes upon an old observation of Halley’s Comet. He decides at once to work out an ephemeris for the comet so that he would know where in the sky it might be. Mr. Seagrave works on the calculations for three years and finally sends the ephemerides for the orbit to E.C. Pickering, Director of HCO) in 1909.** 🔍

## 1907 Historical Highlights

- ◆ January: Percival Lowell presents a talk on Mars in Sayles Hall at Brown University. At this event Dr. Winslow Upton of Ladd Observatory introduces H.P. Lovecraft to Lowell. Frank Seagrave may have also met Lowell at this time.

**July 10: The Providence Journal runs a story about Frank Seagrave and the planet Mars. This appears to have been an interview conducted by a newspaper reporter. Following are a few details from that story.**

### Astronomer Talks about Mars Frank E. Seagrave Much Interested in Planet Has Seen the Polar Caps

**“I observed Mars on the night of July 5, but it is too low in the sky for good observation here and moreover, the atmosphere is not clear enough.”**

**“I could not see the canals on Mars; in fact, no one can hope to see them from these parts. At not over 12 observations have they been seen. Neither Yerkes, Washington nor Harvard has ever sighted the canals Prof. Lowell told me last winter.”**

**“I have never formed an opinion definitely as to Prof. Lowell’s theory of the inhabitability of Mars, on which he lectured in January in Sayles Hall before a very large audience.”**

- ◆ September 7, 1907: The largest ship at the time, The RMS Lusitania, sets sail from Liverpool, England, to New York City on its maiden voyage. The ship is 787 feet in length and 87.5 feet in width, with a weight of 31,550 tons. The Lusitania is also the fastest ship at the time. If you do not remember her place in history, see the 1915 historical highlights to learn her fate.
- ◆ October 17: Guglielmo Marconi continues with his wireless radio transmissions and begins commercial transatlantic Morse Code communications from Clifden, Ireland, to Glace Bay in Nova Scotia. The business enterprise is called The Marconi International Marine Communication Company.
- ◆ October 21: The fossilized mandible (lower jawbone) of one of our ancestors is found in a sand quarry near Heidelberg, Germany, by Daniel Hartmann. It is now thought to be a subspecies of *Homo erectus* and given the classification of *Homo erectus heidelbergensis*. Back in 2010 new dating techniques provide an age of 609,000 +- 40,000 years.
- ◆ December: A chemist, Leo Baekeland, invents Bakelite, and uses the term plastic (which means capable of being shaped or molded) for the first time. Note: did he read Wells’ *First Men in the Moon* – Cavor/Cavorite?) Plastic has many material advantages: it can be molded into any shape; is heat resistant; nonconductive. Unfortunately plastic has become one of our primary environmental pollutants. It can take up to 500 years

to breakdown to the point where it is too small to be seen, but it never disappears.

- ◆ English biologist naturalist Alfred Russel Wallace publishes the book, *Is Mars Habitable? A Critical Examination of Professor Percival Lowell's Book "Mars and Its Canals," with an Alternative Explanation*. In this work Wallace rebuts Percival Lowell's speculation on the alleged Martian "canals," their construction and purpose, by an intelligent species. Wallace explored this topic of other-worldly life in his 1904 book *Man's Place in the Universe*, Wallace believed that the Earth was the only planet in our solar system capable of supporting life, and that humankind was unique. (Note: Unique perhaps, but that does not preclude the existence of any non-human species. DAH) Keep in mind, Wallace had also supported a theory of the transmutation of species, which later "evolved" into Darwin's theory of evolution through natural selection. Alas, there are no Martians.

W. F. Denning, a British amateur astronomer, notes in an article about past planetary observations, that Frank Seagrave reported observing white spots in Venus' cloud tops from January 16- February 5, 1878. The famous French astronomer and artist Étienne Léopold Trouvelot had reported these same white spots and is mentioned in the same paragraph. 🔍

Going forward in our timeline, references to Frank Seagrave in the journals continued to be sporadic at best. For 1907 I found only 1; for 1908 I found 4; for 1909 I found only 8. If anyone knows or can suggest a reason for this five plus year (1904 – 1909) drought please email me.

Fortunately his contributions recovered in 1910.

## 1908 Historical Highlights

- ◆ January 1: A new tradition for ringing in the new year is established in Times Square in New York City by the owner of the New York Times newspaper, whose headquarters is at that location. A lighted iron ball just five feet in diameter is lowered from the roof of the building.
- ◆ A wonderful children's novel, *The Wind in the Willows*, is published by British author Kenneth Grahame. It chronicles the adventures of Mole, Badger and Rat as they help Mr. Toad, who moves from one fad to the next in quick succession. His current obsession is motorcars. WGBH, Boston's PBS affiliate, produced a stop-action animation of this story that aired on March 18, 1989. It was part of their *Long Ago and Far Away* series. Four additional story lines were produced.
- ◆ May 14, 1908: Today we believe technology is moving at a very fast pace, but rapid advancements in science and technology are not new occurrences. Wilbur Wright and his first passenger, mechanic Charles Furmas, fly 1968 feet in 29 seconds. Later that day they fly 2,125 feet in 4 minutes and 2 seconds.
- ◆ June 13: *Anne of Green Gables*, a novel by Canadian author Lucy Maud Montgomery, is published. This work tells the story of Anne Shirley, an orphaned girl's adventures on Prince Edward Island, Canada in the late 1890's. American audiences were introduced to Anne when PBS broadcast the Canadian Broadcasting Corporation's miniseries beginning on February 17, 1986. Canadian actress Megan Follows brilliantly portrays Anne. The miniseries was also part of the *Wonderworks* series. My late wife Tina and I thoroughly enjoyed the series, even watching it again and again during WGBH/PBS pledge drives.
- ◆ June 30: The Tunguska Event - A small stony meteor about 160-200 feet wide enters the Earth's atmosphere above the Podkamennaya Tunguska River in Siberia, travelling at an estimated speed of 16.6 miles per second. It does not reach the ground, but instead explodes at an altitude of 3-6 miles. The explosive force was estimated to be anywhere from 3 to 50 megatons (one megaton is equivalent to one million tons of TNT). This so-called air burst spread downwards and flattens approximately 80 million trees over 830 square miles. Research expeditions to the area did not occur for some time due to the remoteness of the region. When the area is reached, no crater is found, but microscopic spherules found in the soil are analyzed and reasoned to be of an extraterrestrial origin.
- ◆ On July 1, SOS is formally recognized as the international Morse Code distress signal. While the letters were initially not an abbreviation for any phrase, several expressions became popular: "Save Our Souls" and "Save Our Ship."
- ◆ July 26: The BOI (BI), Bureau of Investigation, is established in Washington, DC. In 1935 its name is changed to FBI (Federal Bureau of Investigation).
- ◆ Cambridge University, England: German physicist Johannes Wilhelm "Hans" Geiger and New Zealand physicist Ernest Rutherford develop a device that can detect the alpha particles produced by radioactive decay. The device has become known simply as the Geiger Counter.
- ◆ September 17: A test flight of their new Type A Flyer for the U.S. Signal Corps on September 17 ends in disaster. Orville is accompanied by Lieutenant Thomas Selfridge. At about 100 feet in altitude a propeller split and the plane crashes. Orville suffers a broken leg and broken ribs. Selfridge suffers a fractured skull and dies that evening, becoming the first person to die in a plane crash. (It is interesting to note that the Wright brothers had promised their father that the two of them would never fly together, for fear of them simultaneously suffering the same fate. One exception was granted however. On a six-minute flight on May 25, 1910, at Huffman Prairie in Ohio, Orville was the pilot and Wilbur the passenger. See 1910 highlights.)
- ◆ September 27: Henry Ford's first Model T rolls out of his assembly line plant in Detroit, Michigan. It sets many standards in car production in the United States. While most cars in the US prior to the debut of the Model T have the steering wheel installed on the right-hand side of the vehicle, the "Tin Lizzie," as it became known as, has it installed on the left-hand side. The four-cylinder engine provides a top speed of 42 miles-per-hour!
- ◆ November 3, 1908 - William Howard Taft is elected President, succeeding Roosevelt.
- ◆ Henrietta Swan Leavitt, while working at Harvard College Observatory under director E.C. Pickering, is studying photographic plates of stars in the Magellanic Clouds. She finds 47 Cepheid variable stars, stars whose outer layers expand and contract (pulsate) on a recurring time scale, causing a change in luminosity (brightness). This period-luminosity relationship is used to determine distances to galaxies.
- ◆ George Ellery Hale, astrophysicist and founder of Mount Wilson Observatory, using a modified spectroheliograph, discovers that sunspots were the manifestation of strong magnetic fields. He determines that when simple spot groups

formed in the one solar hemisphere during the beginning of a solar cycle, the leading spot(s) has a specific polarity, while the trailing spot(s) has the opposite polarity. At the same time, spot groups in the other hemisphere were opposite those of the north. When the 11-year (average) cycle ends and the new cycle begins, spot groups in both hemispheres change polarity and are the reverse of the prior cycle. So in fact, there is a 22-year cycle when you consider the magnetic reversal.

[Segrave provides search ephemeris to \*Popular Astronomy\* for Comet Halley's 1910 apparition.](#) 🔍

## 1909 Historical Highlights

- ◆ January 9: The British Antarctic Expedition, under the command of Ernest Shackleton, reaches the furthest southern latitude of 88° 23' S, shy of the South Pole by about 97.5 nautical miles. Shackleton's ship, the *Nimrod*, is a refurbished wooden-hulled, three-mastered sealing vessel, weighing in at only 334 gross tons. It hosts a crew of over 30 men. Though they reach the continent, they never reach the South Pole on this trip. A group of them do climb Mount Erebus, the second highest volcano in Antarctica.
- ◆ January 29: [Segrave sends a search ephemeris for Halley's Comet to E.C. Pickering of HCO. I have posted that letter to Pickering on our \(Google Drive\).](#)
- ◆ February 12: The NAACP (National Association for the Advancement of Colored People) is founded. The date is chosen to coincide with Abraham Lincoln's birth date. In response to the Springfield, Illinois, race riot of August 14 – 16, 1908, it is decided a civil rights organization was seriously needed. While it is initially formed to protect the civil rights of African Americans, its current mission statement is “to ensure the political, educational, social, and economic equality of rights of all persons and to eliminate race-based discrimination.”
- ◆ March 4: William Howard Taft is inaugurated as the 27th President of the United States.
- ◆ March 31: Construction is begun in Belfast, Northern Ireland, on the Olympic class ocean liner, RMS *Titanic*, with the laying of the keel that would become the backbone of the ship. The ship is 882 feet 9-inches in length, 92 feet 6-inches in width, 175 feet in height from the keel to the top of the smokestacks, and weighing in at 46,329 gross tons.
- ◆ April 6: Robert E. Peary, a United States naval officer and explorer, supposedly reaches the geographic North Pole on this date. (There has always been some skepticism regarding this claim.) On July 6, 1908, Robert Peary begins his eighth Arctic expedition to the North Pole. The SS *Roosevelt* sails from New York Harbor with a crew of 22 men. The ship, a three-mastered schooner designed by Peary, is 182 feet long and 35 feet wide, and weighing in at 654 gross tons. Its hull is also 30 inches thick in areas for the same reason. The mast with sails unfurled was only supplemental to the primary 1,000 horsepower steam engine. Top speed is about 9 miles-per-hour. Though he is still credited with achieving success, analysis of various reports have suggested he may not have attained his goal.
- ◆ July 25: Louis Bleriot, a French aviator, takes off from Calais, France, in a single-winged plane, to cross the English Channel and lands in Dover, England. His flight, the first of its kind, takes 36 minutes and 30 seconds to cross the 24 mile distance.

In doing so, he claims a £1,000 (\$4,870 US at the time) prize.

- ◆ August 2: The US Signal Corps purchases a Military Flyer bi-plane from Orville and Wilbur Wright for \$30,000. This two-passenger model can fly an average of 42.5 miles per hour for a distance of 125 miles.
- ◆ August 21: Though planet Pluto was discovered by Clyde Tombaugh on photographic plates on February 18, 1930 at Lowell Observatory in Flagstaff, Arizona, an examination of much earlier images taken at Yerkes Observatory in Wisconsin by E.E. Barnard on August 21 and November 11, 1909, do reveal what later became known as Pluto.
- ◆ September 11: Max Wolff, astronomer and comet hunter, of Heidelberg University in Germany, recovers Comet Halley on a photographic plate. This is the first time photography is used for such a search.

[During the fall of 1909, "prophets" and doomsayers are predicting dire earthly calamities because of the return of Halley's Comet from the outer reaches of our solar system. Segrave continues to send computed positions for Halley's Comet thru the end of 1909. When Halley is recovered photographically on September 11, it is very close to where he said it would be. In fact, Segrave's calculations were better than many of the professionals.](#) 🔍

## 1910 Historical Highlights

### Frank: 50 Years-Old

- ◆ January: Do you remember conducting lab experiments in high school or college using *Drosophila* fruit flies? Who can forget that days or weeks after the experiments were completed the lab was still abuzz with successive generations. Well, you can thank US geneticist Thomas Hunt Morgan for his research into heredity through specific genes on chromosomes. After subjecting fruit flies to agents which could cause mutations, he bred the fruit flies and carefully studied the offspring. Morgan's research explained how chromosomes determined heredity.
- ◆ January 12: While everyone is anxiously awaiting the return of Halley's Comet from the depths of our solar system since its last inner solar system encounter in 1835, a new comet is observed from the Transvaal region of South Africa. Following perihelion on January 17, this Great January Comet of 1910 moves into northern hemisphere skies. Many casual observers thought that somehow Comet Halley, not expected to be a naked-eye object for three to four months, had arrived early. It is easily seen in evening twilight, displaying a curved 50 degree tail. (This comet exceeds the brightness of Comet Halley.) For a time it is even visible in broad daylight.
- ◆ January – May: You may remember in my 1906 highlights I had mentioned Segrave's interest in Halley's Comet. While Frank is reading a German magazine, he comes upon an old observation of Halley's Comet. He decides to work out an ephemeris for the comet so that he would know where to search for it in the sky. When the comet is recovered by German astronomer and astrophotography pioneer Max Wolf on a photographic plate taken on September 11, 1909, it is very close to where Segrave had calculated it would be.
- ◆ Based on Segrave's observations Frank predicts that the comet will become a naked eye object by New Year's Day, 1910, and by late March or mid-April, much detail will be

observable. Spectroscopic data obtained by other astronomers reveal cyanogen gas in Halley's tail, through which the Earth is predicted to pass. Of course panic sets in throughout the world. Click this link to read an article I wrote for the Rhode Island Historical Society's Journal, Vol. 45, May 1986: [https://www.rihs.org/history\\_journal/rhode-island-history-journal-vol-45-may-1986/](https://www.rihs.org/history_journal/rhode-island-history-journal-vol-45-may-1986/) It provides a Rhode Island prospective on this apparition of Halley's Comet and Frank E. Seagrave's contributions.

- ◆ February 8, 1910 - The Boy Scouts of America (BSA) is founded. Its current mission statement is to "prepare young people to make ethical and moral choices over their lifetimes by instilling in them the values of the Scout Oath and Law." Unfortunately, officials and volunteers in the organization apparently did not adhere to this declaration. In 2023, BSA shells out 2.46 billion dollars to settle sexual abuse claims. (May 7, 2024: BSA changes its name to Scouting America, which will take effect on February 8, 2025.)
- ◆ May 25: Prior to this date, Orville and Wilbur Wright had never flown together. Years prior they promised their father they would not do so because if an accident occurred perhaps both of them would die in a crash. However, on this date, Milton Wright gave the boys permission to take a flight together. That flight in Dayton, Ohio, lasts 6-minutes. Later that same day, Orville had another passenger. His 82-year old father joins him on a 7-minute flight, soaring about 350-feet above the ground. What a moment that must have been!
- ◆ June 3, 1910: Norwegian polar explorer Roald Amundsen sets sail from Norway on a journey to reach the South Pole. His ship, the Fram, is specifically built for polar ice conditions. This three-masted schooner is 127 feet 8-inches in length, 34 feet in width, and powered by a diesel engine. Crew complement is 19 men. Amundsen's quest for the South Pole continues into 1911.
- ◆ June 15: Meanwhile, another explorer, Robert Falcon Scott, in his ship Terra Nova, embarks on the British Antarctic Expedition (aka, the Terra Nova Expedition) from Cardiff, South Wales. The Terra Nova is a converted three-masted wooden-hulled whaling ship with one smokestack. It weighs in at 764 gross tons, is 187 feet in length and 31.4 feet in width. It is equipped with a steam engine with a screw propeller. It has a crew complement of 65, including scientists. Because Scott is fundraising in Britain at the time, he later joins the ship in South Africa.
- ◆ June 19: The dirigible LZ-7 Deutschland makes its maiden voyage in Germany. This "zeppelin" airship is to provide the first commercial airship passenger flights. (Ferdinand Zeppelin pioneered rigid airships, and the name became synonymous for all rigid airships; like the word Kleenex is used for all facial tissue.)
- ◆ June 28: During a promotional flight to publicize the passenger air service, the airship crashes during a thunderstorm. Though everyone survives, I have no doubt that it was a media disaster for DELAG (the first passenger airline company) which had organized the event.
- ◆ December 10: The Terra Nova gets trapped in pack ice for 20 days, but does manage to free itself. The adventure continues into 1911.
- ◆ Williamina Fleming, one of E.C. Pickering's women computers at Harvard College Observatory, has the job of classifying stars

based upon their spectra. She discovers the first white dwarf, a star 10 solar masses or less that expended its nuclear fuel, causing its outer layers to expand into space as a planetary nebular. M57, the Ring Nebula, is an example of this stellar evolution. Only the hot stellar core remains. In billions, or perhaps trillions, of years it will become a black dwarf when it will no longer emit light. The nebula will dissipate long before that. Our Sun will evolve in this manner.

Throughout 1910, Frank Seagrave contributes many ephemerides for Halley's Comet to multiple astronomical journals. While he is already respected for his prior contributions to astronomical research, his computational work on Halley's sky coordinates are very well received worldwide. In addition, Frank's celebrity in Providence, Rhode Island grows even larger. See authors note following the 1910 highlights.

Besides Halley's Comet, Seagrave provides ephemeris for Comet 1910 b (Metcalf) for October and November, and also provides ephemeris for bright asteroids Hebe, Metis, Hygeia and Massalia.

On November 28, 1910, Mary Seagrave, Frank's mother, passes away.

## ~ End of Part II ~

Part III will cover the years 1911 through 1920. During this time-span Frank E. Seagrave is referenced 146 times among in astronomical journals.

### Author's Note

When I became historian at the urging of past historian William (Bill) Guca many, many years ago, he provided me with whatever materials he had already uncovered regarding Frank E. Seagrave. This included a few copies of old newspaper articles Bill had obtained using the microfilm viewers at the Rhode Island Historical Society (RIHS) on Hope Street in Providence. These "wet" process copies unfortunately faded very quickly. I could barely read them. I visited the RIHS and reviewed their Providence Journal catalog of material to find additional articles to tell my story of Frank E. Seagrave and Halley's Comet.

The articles I did "print" over 40 years ago are now barely readable as well. To provide the local angle to this historical context document I decided to return to the old newspaper articles and hopefully new technology would allow me to digitally save the wanted articles in order to share them with you.

Fortunately I only recently learned that a service called NewsBank provides access to thousands of newspapers, including the Providence Journal. When I used their search engine I found many more references on Seagrave than listed in the RIHS catalog. I contacted NewsBank to gain unrestricted access to their digitally scanned database of Providence Journal papers. Unfortunately that service is restricted to licensed institutions like colleges, universities, libraries and others. Rhode Island College is one of those institutions, but one has to visit the campus and log in as a guest.

If I decide to pursue that avenue, I will be able to download every Seagrave article as a PDF to further preserve his legacy. While Seagrave's reports in the local newspaper were not as numerous as

those in the astronomical journals, they often explored astronomical topics not submitted to the journals. I uncovered 188 articles submitted by and reported on Seagrave during my research.

The process to download them will take a lot of time, but as I proceed I will post the PDF's on our Google Drive in chronological order from earliest (1878) to latest (1934).

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## Google Drive Links

Catalog of Seagrave Astronomical Journal references thru 1899  
<https://docs.google.com/spreadsheets/d/1XsKH-EsQM0PHgShEYoCsVktjsqKZ8vwl/edit?gid=998212642#gid=998212642>

ADS Access Instructions  
<https://drive.google.com/drive/folders/1JST81Svc6u3gJEEV-hCBJHH7uV3mNKh->

Archived Frank E Seagrave Material  
<https://drive.google.com/drive/folders/1Y6Yaree8rp3nTRQuq5MX1NnbEaAVIVmQ>

14 Frank Seagrave Images and 1 video  
[https://drive.google.com/drive/folders/1VKaE0umER8f2Ej-G3W3-2NFZ\\_UxdRKvj](https://drive.google.com/drive/folders/1VKaE0umER8f2Ej-G3W3-2NFZ_UxdRKvj)

Seagrave Notebooks  
<https://drive.google.com/drive/folders/1VJ-6uQfdMjQ5YaoDWQYKCYmRHkrdLbW0>

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# Star Party Reports

Callahan School, Harrisville

November 7, 2024

By Dave Huestis

It had been many moons since Skyscrapers, Inc., the Amateur Astronomical Society of Rhode Island, had provided a stargazing event for Callahan Elementary School in Harrisville, Rhode Island. Bad weather canceled many events, and the pandemic curtailed our activities for a while as well.

But on November 7, we were finally successful in sharing our love of astronomy with the Callahan Elementary School community.

Like our star party at Steere Farm Elementary School in the same town of Burrillville on October 11, Mother Nature provided clear and cool skies for about 65 guests.

A waxing crescent Moon (a day before first quarter) made a big impression on everyone. Saturn and his rings certainly amazed the visitors. While one can view a myriad of Saturn images on the internet, nothing can compare to the view through a telescope, especially when knowing the planet on that evening was about 851 million miles from the Earth.

As the evening progressed, Jupiter finally rose high enough to observe. His four Galilean moons were easily visible, as were some belts and zones.

Skyscrapers' members provided a wide variety of telescopes in many sizes: 80mm f/6 refractor; 5-inch Celestron reflector; 12.5" f4.8 dob; 4 1/8" (105mm) Astroscan; homemade 8 inch Newtonian on a Meade computerized go to mount.

To provide some observational variety,



some views were provided of Alcor and Mizar, the Coathanger cluster, the Pleiades, the Ring Nebula and M13.

Some comments to note:

I received a heartwarming star party report from one of our volunteers, Jim Hendrickson. I am including most of it here:

"After about a decade of cloud-outs, it was great to return to Callahan School on Thursday, November 7 under perfectly clear skies and a 6-day crescent Moon.

When we first arrived, I set up my 80mm refractor and trained it on comet C/2023 A3 Tsuchinshan-ATLAS, which was moving through Ophiuchus. The comet still displayed a distinct tail, but was perhaps a bit too dim to be worthy of showing for public viewing. The moment felt rather symbolic, because I was attending Callahan School during the last passage of Halley's Comet in 1985-86, which I never did see. Standing in the school's field while observing a comet

almost felt like a completion of a chapter that started so long ago. I attempted to get the comet in Chris's 12-inch Dobsonian, but was unable to locate the star pattern in the finder.

Highlights of the night were the Moon and Saturn, but operating a smaller telescope allowed me to showcase objects more suited to wide-field views. I started with Mizar and Alcor in the Big Dipper, which were positioned low in the northwest. When they became too low, I moved to a seasonal favorite, the Coathanger in the Summer Triangle. Most who viewed the asterism could easily see the resemblance. A short time later, the Pleiades were well-positioned, and I kept them in view for much of the rest of the session. Many of the responses were an instantaneous "oh wow!" But there were a couple of "it's just a bunch of stars?" as if there was some other expectation. I guess being set up towards the back



of the field, away from the bigger scopes trained on the Moon, Saturn and Jupiter, the Pleiades may have been less impressive.

A little over an hour later most of the guests had left. Francine, John and I stayed a while longer to take in some views of Jupiter through John's 8-inch Newtonian."

Chris Harkins, using his 12-inch dob started with M13. He said, "A little challenging due to the moonlight washing it out but all seemed to enjoy it especially when I told them to look beside it instead of directly at it and described what it was. Then moved onto the ring nebula in Lyra and explained what it was."

Francine Jackson commented, "Everyone was fascinated with the Astroscan, but its image of the Moon made them quickly forget how weird it looks. All who were there were very friendly and eager to look, especially several young people. Perhaps we have some budding astronomers in the mix."

The Moon looked great with Bob Janus' Celestron 5-inch reflector under 50X. He said he got "a lot of "OOOOs" and "aaaahs" from the younger ones. I tried to send people home with two lunar things to remember: terminator line and earthshine."

We provided many handouts for our



guests that they could use to supplement their astronomical experience over the coming weeks.

Many thanks to the following Skyscrapers members who supported this successful event: Jim Hendrickson, Francine Jackson, Bob Janus, Chris Harkins, John Kocur, and yours truly.

**River Bend Farm, Uxbridge  
November 8, 2024**

**By Francine Jackson**

The sky looked beautiful all day, until we began to drive to the site on November 8th. Then the clouds filled the sky, making us wonder whether there would be any observing at all; however, as fast as the clouds came, they disappeared, and the Moon beautifully came into view.

About 18 hardy persons came, many with their children, which was nice, as we don't often have many young people to these.

With her Astroscan, Francine kept her scope at the Moon, and it was amazing how many of the public kept coming back to see it. Also, as there were more children there than the normal night, they wanted to return, sometimes several times, to look at it.

Jim Hendrickson and John Kocur were able to scan the skies for a great many objects, including Saturn (everyone's favorite), Albireo, with its two lovely colors, Alcor and Mizar, the Coat Hanger, M31, and others.

With us, too, were Sherine, the ranger assigned to the facility, and Allison Horrocks, part of the National Park system. They also enjoyed all the views, plus the number of children present – not a normal observing crowd – and both stayed through much of the night.

One of the fortunate parts of the evening was the temperature. In November 2023, in addition to the cold, the wind made observing totally uncomfortable (an understatement), so we were a bit wary of having a night so late in the year, but, although it was rather cold, it wasn't unbearable, and, as everyone who showed up said to us, "This was great! See you in April!" For them, it had been a very worthwhile night.

**Winman Middle School, Warwick  
November 15, 2024**

**By Francine Jackson**

The annual night at Winman school was on a perfect night: clear skies, with the Full Moon, Saturn, Venus and Jupiter in the sky. Jim Hendrickson and Francine Jackson



came with their telescopes

The close to a hundred students and parents were divided into six groups, with varied programs in the woods at the school, followed by observing. Francine kept her Astroscan pointed at the rising Moon, while Jim began at Saturn, then when one student changed the orientation of his scope, Jupiter was a better target.

Everyone who came to observe was thrilled with what they saw, and one of the teachers mentioned that the previous year, several students mentioned they wanted telescopes for the holidays, as they were amazed with what they could see with them.

Next year's program will be Wednesday, November 6th, 2025. Hope others can come and enjoy the evening.

### **North Scituate Library November 15, 2024 By Bob Janos**

The North Scituate Library's November 15th star party was held under clear sky with mild temperatures. The session ran from 6:00 to 7:30 pm. Dave Huestis and Bob Janus along with Alex Willians (reference librarian) and Alyce Margadonna (youth services librarian) greeted the 25 patrons and their parties who had registered. This event was held at the gazebo area across the street from the library.

The gazebo served as a very nice visitor's center where a variety of astronomy outreach literature was available.

The many sources of bright lights surrounding the area blocked out most of the features in the night sky. However, the full moon, Saturn and Jupiter provided very pleasing objects to view in spite of the lighting. We had an 8 inch Dobsonian and the library's table top Newtonian for people to look through. People were encouraged to get hands-on experience with the library telescope. Folks teamed up with one person aiming the red dot finder at either the moon or Jupiter while a second person looked for the object to appear in the eyepiece. We reminded folks that they can use their library cards to take this telescope home.

### **Moonrise on the Seekonk November 16, 2024 By Francine Jackson**

One of the more anticipated programs, Jim Hendrickson, Michael Corvese, Terry Turner and Francine Jackson set up on the banks of the Seekonk River Saturday, November 16 for this annual event. With the



Moon rising about 4:45, the telescopes were waiting, while the band played mood - or Moon - music.

Also waiting for the Moon was Greg Gerritt, founder of Moshassuck Critters, who came to video the event; also, several others set up cameras on tripods, waiting.

The Moon was a little late, as thick clouds were blocking the horizon, but, when the Moon rose above them, the sight was met with a lot of people amazed at how

beautiful it was.

In addition, Mike aimed his telescope at Saturn, which, as ever, was a fan favorite.

We did have several guests come more than one time to look through the telescopes, but it was believed at least 60 people enjoyed the program.

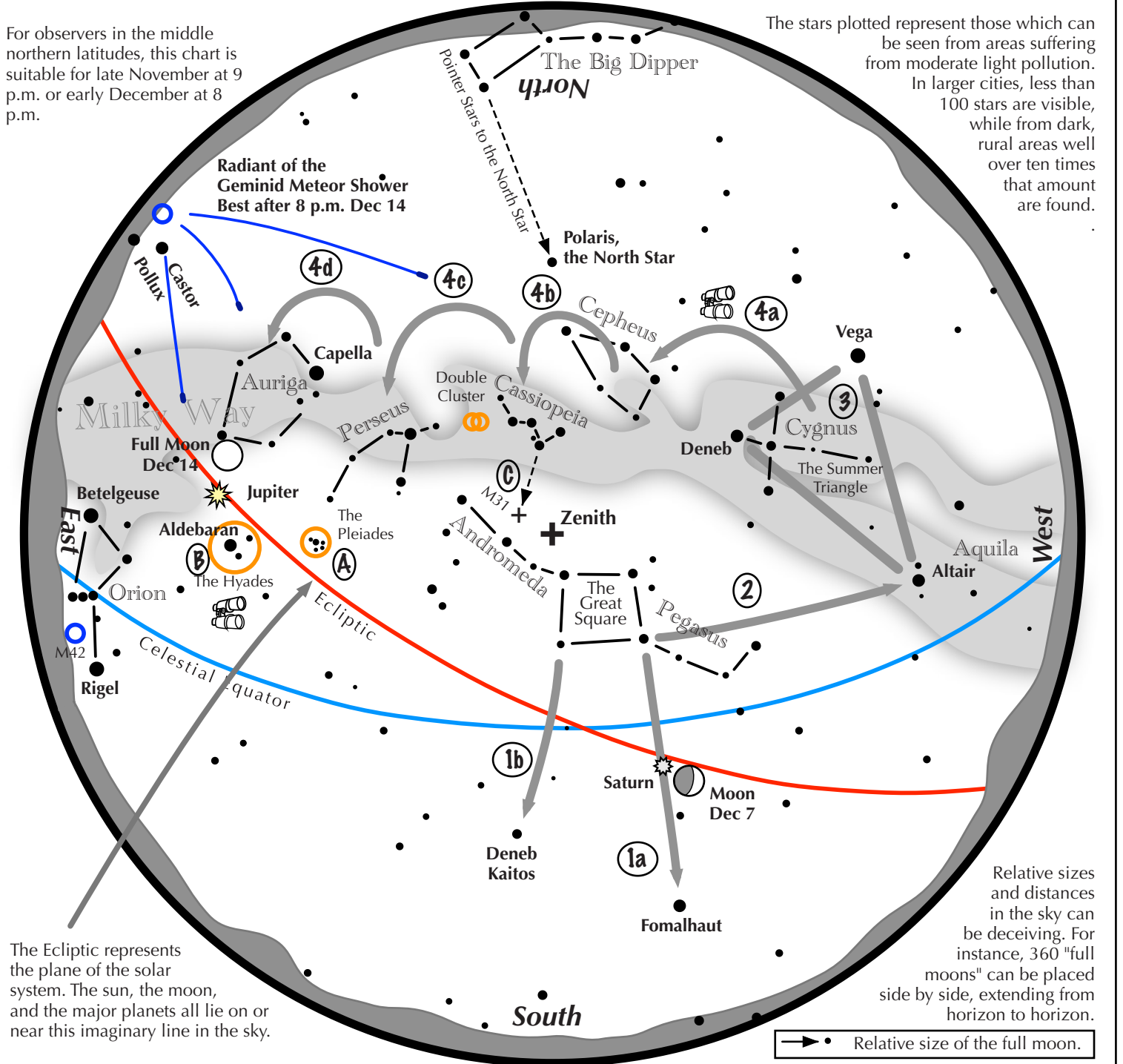
Everyone, both participants and the public, was thrilled to be at this annual event, and all were promising to return next year.



# Navigating the December Night Sky

For observers in the middle northern latitudes, this chart is suitable for late November at 9 p.m. or early December at 8 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

## Navigating the December night sky: Simply start with what you know or with what you can easily find.

- 1 Face south. Almost overhead is the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend an imaginary line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the southwest. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second bright star in the south.
- 2 Draw another line, this time westward following the southern edge of the Square. It strikes Altair, part of the "Summer Triangle."
- 3 Locate Vega and Deneb, the other two stars of the "Summer Triangle." Vega is its brightest member while Deneb sits in the middle of the Milky Way.
- 4 Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, to Perseus, and finally to Auriga with its bright star Capella.

### Binocular Highlights

- A and B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters.
- C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.
- D:** Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas.



# The Sun, Moon & Planets in December

This table contains the ephemeris of the objects in the Solar System for each Saturday night in December 2024. Ephemeris times in Eastern Standard Time (UTC-5) for Seagrave Observatory (41.845N, 71.590W).

Object	Date	RA	Dec	Const	Mag	Size	Elong	Phase(%)	Dist(S)	Dist(E)	Rise	Transit	Set
<b>Sun</b>	<b>7</b>	16 56.5	-22 38.2	Oph	-26.8	1948	-	-	-	0.985	07:00	11:38	16:15
	<b>14</b>	17 27.2	-23 13.6	Oph	-26.8	1949.8	-	-	-	0.984	07:06	11:41	16:16
	<b>21</b>	17 58.3	-23 26.3	Sgr	-26.8	1950.9	-	-	-	0.984	07:10	11:44	16:19
	<b>28</b>	18 29.3	-23 16.1	Sgr	-26.8	1951.5	-	-	-	0.983	07:12	11:48	16:23
<b>Moon</b>	<b>7</b>	21 49.5	-17 10.4	Cap	-11.4	1913.8	69° E	32	-	-	11:51	17:16	22:52
	<b>14</b>	4 07.0	24 51.3	Tau	-12.7	1982.3	161° E	97	-	-	15:18	23:29	07:44
	<b>21</b>	10 45.0	9 36.4	Leo	-12.2	1792.2	111° W	68	-	-	21:59	04:45	11:19
	<b>28</b>	15 54.9	-25 10.7	Sco	-9.9	1783.8	35° W	9	-	-	05:20	09:45	14:06
<b>Mercury</b>	<b>7</b>	16 48.0	-20 44.1	Oph	5.9	9.9	3° W	1	0.308	0.680	06:39	11:22	16:06
	<b>14</b>	16 21.4	-18 38.1	Sco	1.2	8.8	16° W	23	0.324	0.770	05:39	10:31	15:24
	<b>21</b>	16 27.9	-19 10.8	Sco	0.0	7.3	21° W	51	0.360	0.925	05:23	10:13	15:03
	<b>28</b>	16 55.5	-20 55.7	Oph	-0.2	6.3	22° W	70	0.400	1.075	05:31	10:14	14:57
<b>Venus</b>	<b>7</b>	20 09.7	-22 33.9	Cap	-4.0	18.2	44° E	66	0.726	0.932	10:14	14:51	19:29
	<b>14</b>	20 43.1	-20 31.4	Cap	-4.1	19.2	45° E	63	0.725	0.882	10:11	14:57	19:44
	<b>21</b>	21 14.9	-18 04.6	Cap	-4.1	20.4	46° E	60	0.724	0.831	10:05	15:01	19:58
	<b>28</b>	21 45.1	-15 17.8	Cap	-4.2	21.7	47° E	57	0.723	0.780	09:56	15:03	20:12
<b>Mars</b>	<b>7</b>	8 37.2	21 27.6	Cnc	-0.6	12.2	129° W	94	1.586	0.768	19:52	03:17	10:42
	<b>14</b>	8 36.2	21 51.4	Cnc	-0.8	12.8	137° W	95	1.594	0.729	19:22	02:48	10:15
	<b>21</b>	8 32.3	22 25.0	Cnc	-0.9	13.5	145° W	97	1.602	0.695	18:43	02:12	09:41
	<b>28</b>	8 25.5	23 06.6	Cnc	-1.1	14.0	153° W	98	1.609	0.668	18:05	01:37	09:10
<b>1 Ceres</b>	<b>7</b>	20 14.3	-27 02.1	Cap	9.3	0.3	45° E	99	2.964	3.580	10:38	14:53	19:08
	<b>14</b>	20 25.1	-26 27.3	Cap	9.3	0.3	40° E	99	2.965	3.647	10:19	14:36	18:54
	<b>21</b>	20 36.1	-25 49.9	Cap	9.3	0.3	36° E	99	2.967	3.708	09:59	14:20	18:41
	<b>28</b>	20 47.2	-25 09.9	Cap	9.2	0.3	31° E	99	2.969	3.763	09:39	14:03	18:27
<b>Jupiter</b>	<b>7</b>	5 01.1	22 04.4	Tau	-2.6	48.1	179° W	100	5.074	4.089	16:09	23:37	07:04
	<b>14</b>	4 57.0	21 59.4	Tau	-2.6	48.0	173° E	100	5.077	4.098	15:38	23:05	06:32
	<b>21</b>	4 53.1	21 54.4	Tau	-2.6	47.7	165° E	100	5.079	4.123	15:07	22:34	06:00
	<b>28</b>	4 49.4	21 49.7	Tau	-2.6	47.3	157° E	100	5.081	4.162	14:36	22:02	05:29
<b>Saturn</b>	<b>7</b>	23 00.8	-8 31.6	Aqr	1.0	17.2	88° E	100	9.638	9.627	12:07	17:38	23:09
	<b>14</b>	23 01.9	-8 23.6	Aqr	1.0	17.0	81° E	100	9.636	9.742	11:40	17:12	22:44
	<b>21</b>	23 03.3	-8 13.8	Aqr	1.1	16.8	74° E	100	9.634	9.855	11:13	16:46	22:18
	<b>28</b>	23 05.0	-8 02.3	Aqr	1.1	16.6	68° E	100	9.632	9.965	10:47	16:20	21:53
<b>Uranus</b>	<b>7</b>	3 28.6	18 37.6	Tau	5.6	3.8	159° E	100	19.558	18.634	14:52	22:05	05:17
	<b>14</b>	3 27.5	18 33.9	Tau	5.6	3.8	152° E	100	19.556	18.684	14:24	21:36	04:48
	<b>21</b>	3 26.5	18 30.6	Tau	5.6	3.8	144° E	100	19.555	18.748	13:56	21:08	04:20
	<b>28</b>	3 25.7	18 27.6	Tau	5.7	3.7	137° E	100	19.554	18.823	13:28	20:39	03:51
<b>Neptune</b>	<b>7</b>	23 51.5	-2 20.1	Psc	7.9	2.3	102° E	100	29.895	29.679	12:35	18:29	00:22
	<b>14</b>	23 51.6	-2 19.6	Psc	7.9	2.3	95° E	100	29.895	29.799	12:07	18:01	23:55
	<b>21</b>	23 51.7	-2 18.4	Psc	7.9	2.3	88° E	100	29.895	29.920	11:40	17:34	23:27
	<b>28</b>	23 51.9	-2 16.6	Psc	7.9	2.3	81° E	100	29.894	30.041	11:12	17:06	23:00
<b>Pluto</b>	<b>7</b>	20 13.3	-23 15.3	Cap	14.5	0.2	45° E	100	35.155	35.843	10:19	14:51	19:23
	<b>14</b>	20 14.0	-23 13.1	Cap	14.5	0.2	38° E	100	35.160	35.928	09:52	14:24	18:53
	<b>21</b>	20 14.9	-23 10.7	Cap	14.5	0.2	31° E	100	35.164	36.001	09:25	13:57	18:30
	<b>28</b>	20 15.7	-23 08.3	Cap	14.5	0.2	24° E	100	35.169	36.062	08:58	13:31	18:04

# Astrophotography 2024

by John Kocur

August and October 2024 were full of activity, astronomically speaking, with aurora, the comet, and the Super Moon. The weather was favorable for observing, outreach events, AstroAssembly, and astrophotography. To start, River Bend Farm observing on 8-16-24, turned out to be a good night. Brianna Drew from Uxbridge, MA, took this beautiful image of the waxing gibbous Moon which was at 88% illumination and at a distance of 235,997 miles. It was taken through my Orion 80 mm ED Apochromatic refractor with her iPhone attached to a 9 mm Televue Nagler eyepiece.



I took a shot of the Moon on 8-20-24 from my backyard in Killingly, CT. Here is my setup using the same equipment. The phone camera holder is a Tridaptor. It is a high quality adapter that will work with most smart phones and with eyepieces up to 2.4 inches in diameter. It is made out of machined aluminum with an anodized finish. It is able to adjust in all 3 axes ( x,y,z ) and is very stable and precise.



This is a waning gibbous Moon, 99% illumination at a distance of 226,728 miles.

Settings: Pro Mode, ISO 50, aperture 26 mm, F1.8, 1/350 sec exposure, color corrected and sharpened, taken by John Kocur.

This is the setup.



80 mm Orion Eon with a Moonlite focuser, Meade LXD 75 GOTO mount, GSO diagonal, 9 mm Televue Nagler, Tridaptor smart phone adapter, Btr Power LiFePO4 50 AH battery, a Dewnot heater system, and Samsung S 20 smartphone.



Next up was AstroAssembly, 10-5-24. This image of the Sun was taken at Seagrave Observatory through the same telescope and equipment using a Thousand Oaks solar filter with Kaitlyne Goulette's iPhone.

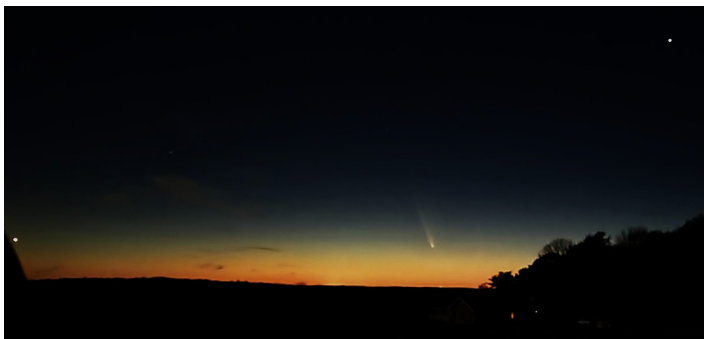


This solar activity led to the auroral display on 10-10-24 in Killingly, CT. It was a short duration event which only lasted about 30 minutes. It started at 7:15 PM and hit its peak brightness at 7:31 PM then slowly tapered off around 7:45 PM. The aurora still lingered in the Northern sky around Midnight but was not as active or vivid.



The aurora photo was taken with my Samsung S 20 using a photo tripod. Settings were Pro Mode, ISO 125, 13mm aperture, F2.2, 10sec. exposure.

On 10-12-24, I got my first image of comet C/2023 A3 (Tsuchinshan-ATLAS). It was very low on the horizon. I was able to get a decent shot with less than optimal conditions. Samsung S 20 mounted on a photo tripod. Shot in Night Mode, ISO 3200, 26mm aperture, F1.8, ¼ sec. exposure. Venus is lower left, Arcturus upper right.



Two nights later, 10-14-24, I got an image of it streaking through the clouds with a 15 degree long tail.



Settings: Pro Mode, ISO 400, 26mm aperture, F1.8, 4 sec. exposure. Next shot was on 10-16-24, 8 sec. exposure. I had to contend with the 98% near full moon.



On 10-20-24, the comet is starting to fade, but the sky is darker. It is setting later.



Taken from my yard with S 20. Settings : Pro Mode, ISO 1600, aperture 26mm, F1.8, 8 sec. exposure.





On 10-21-24, I decided to get a close up shot of the comet with my homemade 8 inch, F6 Newtonian reflector. I used eyepiece projection with the S 20 and Widescan 30 mm eyepiece. Taken from Killingly, CT. , good view of the horizon near my house. Venus is on the left.



Here is the result. Settings : ISO 1600, aperture 26 mm, F1.8, 4 sec. exposure.

My plan in the near future is to do some deep sky guided and long exposure widefield astrophotography using stacking and post processing techniques.

# The Four Supermoons of 2024

by Gregory T. Shanos

On average the moon is 238,855 miles (384,400 km) from Earth. Since its orbit is elliptical, at its farthest point, known as apogee, the moon is 252,088 miles (405,696 km) distant. At its closest point, or perigee, the moon is 225,623 miles (363,105 km) away.

A supermoon refers to any full moon that occurs when the moon is within 90% of its closest approach to Earth. The supermoon is 7% larger and 14% brighter than a typical full moon. Another reference states that a supermoon can appear up to 14% larger and 30% brighter compared to a typical full moon. I state both references for completeness. Either way, a supermoon is both larger and brighter than a typical full moon.

A supermoon requires two key alignments to occur. The moon needs to be at its closest approach, or perigee, to the Earth in its orbit. The moon also needs to be at full phase, which happens every 29.5 days when the sun fully illuminates the moon. Therefore supermoons can only happen a few times a year because the moon's orbit changes orientation while the Earth orbits

the sun – that is why we don't see a supermoon every month. Serendipitously, there will be four supermoons in a row this year on August 19th, September 17th, October 17th, and November 15th.

I was fortunate enough to observe all four supermoons under good seeing conditions perfectly clear skies! As a treat, the September 17th supermoon occurred during a partial lunar eclipse which was maximum at 8.7% during totality. Below are my images of the supermoons. All were

taken using A Meade 60mm 260mm f/4 refractor was tracking the moon on an inexpensive Orion EQ equatorially mounted tripod. A ZWO ASI 178MM monochrome camera with an Optolong UV-IR cut filter using Firecapture v2.7.14 to acquire the video and a MSI GF65 gaming computer. The SER video file was processed using Auto-stakkert 3.1.4 and Registax 6.1.0.8. Further sharpening and processing in Photoshop CS4. Image by Gregory T. Shanos Longboat Key, Sarasota, Florida.

Name	Date and time	Distance from Earth
Sturgeon Blue Moon	Aug. 19 at 2:26 p.m. ET (1826 GMT)	224,917 miles (361,970 km)
Harvest Moon	Sept. 17 at 10:34 p.m. ET (0234 GMT on Sept 18)	222,131 miles (357,486 km)
Hunter's Moon	Oct. 17 at 7:26 a.m. ET (1126 GMT)	222,055 miles (357,364 km)
Beaver Moon	Nov. 15 at 4:29 p.m. ET (2129 GMT)	224,83 miles (361,867 km)

[The four supermoons of 2024 according to data from Fred Espenak's guide](#)



Upper Left: The Sturgeon Blue Supermoon occurred at 2:26 p.m. EDT (18h 26m UT) on Monday, August 19, 2024, when the moon was 100% fully illuminated. However, it was daytime from my location and the moon had not yet risen. This image was taken on August 19, 2024 at 11:48pm local time or August 20, 2024 at 3h 48m UT when the moon was full at 99.7% phase and only 37° above the horizon.

Upper Right: The Harvest Supermoon occurred during a partial solar eclipse! This image was taken two minutes after maximum eclipse (8.7%) on September 17, 2024 at 10:46pm local time or September 18, 2024 2h 46m UT. The eclipsed supermoon was only 38 degrees above the horizon.

Lower Left: The Hunters Supermoon occurred at 7:26 am EDT (11h 26m UT)

on Thursday, October 17, 2024, when the moon was 100% fully illuminated. However, it was daytime from my location and the moon was setting. This was the largest supermoon of the year. This moon was 14% larger at 33.5 arc sec in diameter. This image was taken on October 17, 2024 at 10:33pm local time or October 18, 2024 at 2h 33m UT when the moon was full at 99.4% phase and only 41° above the horizon.

Lower Right: The Beaver Supermoon occurred at 4:29 p.m. ET (21h 29m UT) on Friday, November 15, 2024, when the moon was 100% fully illuminated. However, it was daytime from my location and the moon had not yet risen. This image was taken on November 15, 2024 at 8:52 pm local time or November 16, 2024 at 1h 52m UT when the moon was full at 99.8% phase and only

40° above the horizon.

I was fortunate enough to observe all four supermoons under good seeing conditions perfectly clear skies! As a treat, the September 17th supermoon occurred during a partial lunar eclipse which was maximum at 8.7% during totality. All images were taken using a Meade 60mm 260mm f/4 refractor tracking the moon on an inexpensive Orion EQ equatorially mounted tripod. A ZWO ASI 178MM monochrome camera with an Optolong UV-IR cut filter using Firecapture v2.7.14 to acquire the video and a MSI GF65 gaming computer. The SER video file was processed using Autostakkert 3.1.4 and Registax 6.1.0.8. Further sharpening and processing in Photoshop CS4. All images by Gregory T. Shanos Longboat Key, Sarasota, Florida.

# Directions to Seagrave Memorial Observatory

## 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.



47 Peeptoad Road  
North Scituate, Rhode Island 02857