the Skyscraper

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

In This Issue:

Seagrave Observatory is closed as of August 28 until further notice.

Out of an abundance of caution, we will not be having any night time observing due to the threat of EEE virus. We hope to reopen again in late September or Early October. Please watch our website for updates.

Phases of the Moon

First Quarter Moon
September 6 03:10

Full Harvest Moon
September 14 04:33

Last Quarter Moon
September 22 02:41

New Moon
September 28 18:26

Friday, September 6, 7:00pm
at Seagrave Observatory

Member Presentations: My Astronomical Summer Vacation

This summer, Steve Hubbard was able to go to MARS (Maine Astronomy Retreat). He will be sharing some fun details and pictures of the event which featured super dark skies and some great viewing.

Jim Hendrickson and Francine Jackson recently returned from a trip to New York City where they visited many sites with cosmic significance. They will present some of their finds.

President's Message

by Steve Hubbard

Now that summer is winding down, we are approaching one of my favorite Astronomy seasons. Fall! Longer nights, cool temps and NO mosquitoes. It doesn't get much better than that, right?

And there are lots of great things to see too. Like the Andromeda Galaxy, Saturn, Cassiopeia and M15. We'll be having another member star party at the end of September, so there's every reason to get those telescopes, binoculars or just your eyeballs out there and enjoy all the late summer / early fall skies have to offer.

As if this wasn't exciting enough, Fall is also AstroAssembly time!!! I can hardly believe it, but this will be my 46th year of AstroAssembly. It's always a great event with usually good weather, lots of visitors, great speakers and of course, great food.

This year is no exception. Your very hard working second VP, Bob Horton and his team have been hard at work putting another exceptional program together for us. We have some wonderful speakers with very interesting talks lined up for you. Take a look at our website for more details. There's a link to register and everything you need to know to make sure that you don't miss this.

When you look back on your life someday, don't subject yourself to regret, self-recrimination and heartache because you missed AstroAssembly. You absolutely won't regret it, I promise!

Solar Variability: Our Inconstant Sun

by Dave Huestis

I went to bed last night wondering where the Sun had gone. Then it dawned on me. A little astronomy humor to begin a serious discussion on our life-giving star—the Sun.

Our Sun coalesced out of a vast cloud of gas and dust some 100 times the size of our solar system roughly five billion years ago. Gravity contracted this mass until the core of this proto-star reached about 24.5 million degrees Fahrenheit. At that time nuclear fusion began, converting about 600 million tons of hydrogen to helium per second. This process has been ongoing since then.

Most folks take for granted that the Sun rises and sets every day due to the Earth's almost 24-hour rotation. The only change most people recognize is the seasonal cycles caused by the fixed 23.5 degree tilt of our planet's axis in its orbital path about the Sun. Reference this video to refresh your memory on the Earth's annual journey: https://www.youtube.com/watch?v=d6rgyJkrMXg

Although our Sun is a very stable G2 yellow dwarf star, it does have a slight "variability." Over an average 11-year cycle solar activity waxes and wanes. Most apparent of this activity manifests itself in the appearance of dark sunspots, regions of intense magnetism residing as depressions in the Sun's photosphere (the visible "surface" of the Sun). Solar activity rises from solar minimum, where no or few sunspots are visible, to solar maximum, where hundreds of sunspots can be counted. That peak activity then subsides back down to another solar minimum. This period is called a solar cycle, and currently we are at solar minimum at the end of Cycle 24, which began in January 2008. (All other solar activity follows this pattern, including solar flares, prominences and coronal mass ejections (CME's).

There is also a 22-year cycle. At the end of an 11-year cycle, groups of the new cycle have reversed polarity magnetic fields. You can read more about this topic and other pertinent solar facts on the Skyscrapers website: http://www.theskyscrapers.org/stuff/contentmgr/files/2/f19a9ea97f57f5a6effa42c91b8dc910/documents/solar_lab.doc. The appearance of reversed polarity groups, along with the fact that they form at higher north and south solar latitudes, indicates the Sun is transitioning to a new cycle. However, groups of old and new polarities do coincide during the transition.

Current Cycle 24 was slightly unusual in that it sported two peaks. The largest, in April 2014, was preceded by an earlier peak in March 2012. Despite this scenario, Cycle 24 displayed the lowest peak since 1906.

Also, the last minimum, between Cycle 23 and Cycle 24, was quite deep (prolonged). There were many spotless days. At the time I was searching the solar literature online looking to see if solar physicists were thinking of giving that period a name. Other deep minimums which produced global climate effects received names like the Maunder Minimum (1645-1715), Dalton Minimum (1790-1830) or Sporer Minimum (1450-1540). Fortunately, a group of the new cycle formed and Cycle 24 began.

Original forecasts of very high solar activity for Cycle 24 were predicted. However, as the months progressed the forecasts were downgraded.

It is an easy task to follow the progress of each solar cycle. Decades ago, I used my own telescope equipped with a special solar filter to conduct sunspot counts. This process was fine for clear or partly cloudy days, but often around here in southern New England we can experience days upon days of overcast skies. Today, solar observatories orbiting the Earth provide uninterrupted high-resolution solar images, thereby making sunspot counting very convenient.

Several members of Skyscrapers have been participating in a sunspot count project since September 18, 2012. In addition, in order to provide my Bryant University astronomy lab students an "eyes on" project, they conduct sunspot counts for an 11-week period each semester. During solar maximum it was indeed a challenge for them to get the hang of determining groups and counting spots. However, by the end of a

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 **September 15** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

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semester most of them became good solar observers. I wish they could have continued once the lab finished.

As Cycle 24 continues towards solar minimum (a determination of which can be made only after we have reached and surpassed it), there have been many spotless days. 2018 totaled 221 days, while 2019 up through July 20 has totaled 130 days with no spots. Not necessarily consecutive days. Short-lived groups with less than five spots each were the norm if they evolved. Despite the apparent low numbers, solar physicist Lisa Upton with Space Systems Research Corp believes there is "no indication that we are currently approaching a Maunder-type minimum in solar activity."

That is good news. Humankind would find a deep minimum very disruptive. Reference this website https://en.wikipedia.org/wiki/Maunder_Minimum on the Maunder minimum to increase your awareness of the consequences. Even now cosmic rays pose an intensified threat to astronauts and passengers in high flying aircraft due to a decreased solar magnetic field. The lack of solar activity also allows the Earth's atmosphere to shrink, preventing space debris from de-orbiting due to atmospheric drag.

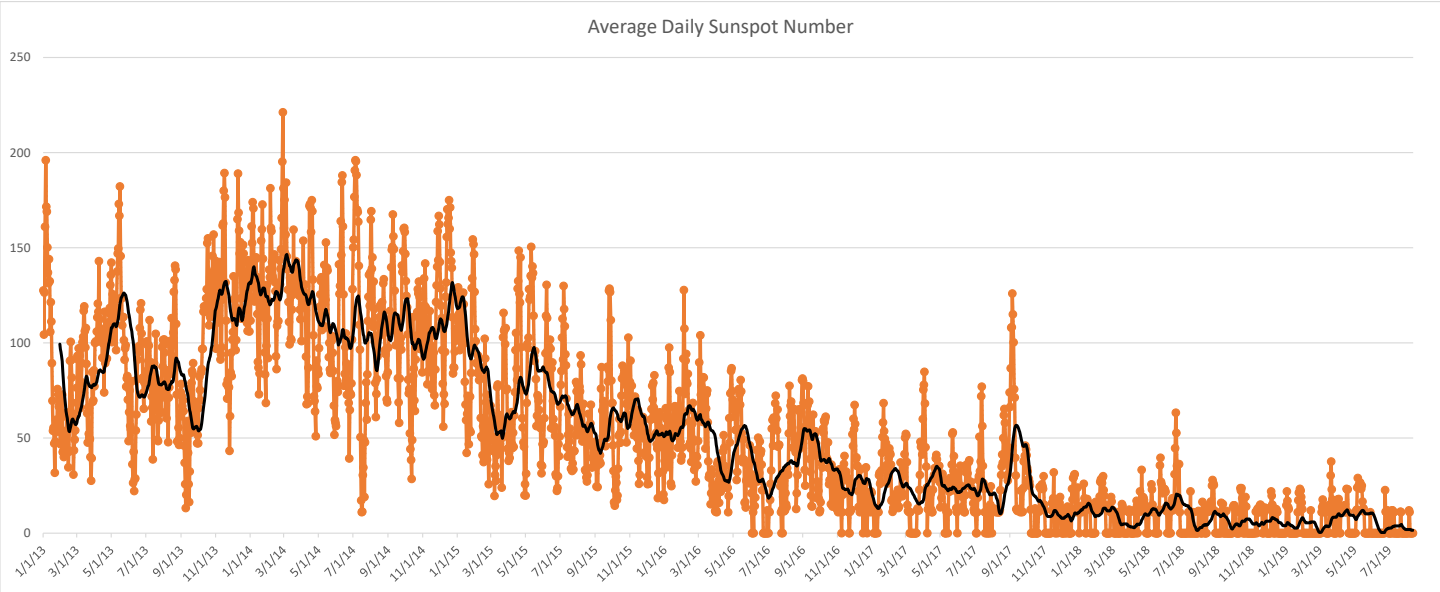
The opposite extreme also poses danger. When solar activity is high, our atmosphere expands, thereby increasing drag on our orbiting spacecraft. In fact, Skylab, a United States orbital laboratory, reentered the Earth's atmosphere ahead of schedule in July 1979 due to this specific problem. Most of it plummeted into the Indian Ocean, while some pieces fell in Western Australia.) And on March 11, 1989, Hydro-Quebec was shutdown by a huge geomagnetic storm caused by an intense solar storm. Circuit breakers tripped when transformers melted due to the amount of energy that entered the system from the event.

According to solar physicist Lisa Upton, "We expect Solar Cycle 25 will be very similar to Cycle 24: another fairly weak maximum, preceded by a long, deep minimum." The current solar minimum will continue thru 2019, likely ending in 2020. The next solar maximum is expected in 2024-2026.

Unfortunately, the relatively small variability in solar activity has far reaching consequences for climate change. I have read reports hoping for a Maunder-type minimum in the hopes a decades-long solar minimum would mitigate the effects of global warming. Yes, global warming. Precisely stated. Climate change says little. I've become quite cynical as I've aged, and I believe humankind is past the point of intervention. I'm unsure whether a natural phenomenon could bring about a recovery either. Agricultural and socio-economic interests will be adversely compromised whichever way it goes.

In 1789 Benjamin Franklin stated, "Our new Constitution is now established, and has an appearance that promises permanency; but in this world nothing can be said to be certain, except death and taxes." While the permanency of the Sun is guaranteed for another five billion years, let's hope extreme solar variability does not threaten our already fragile ecology.

Dave Huestis is Skyscrapers Historian and has been contributing monthly columns to local newspapers for nearly 40 years. See more at http://theskyscrapers.org/dave-huestis



The collected data shown here from January 1, 2013 through August 12, 2019. Graph shows the average relative sunspot number for every day for all observers. The relative sunspot number is calculated using this formula: R=10(number of groups) + number of spots. So, if I counted 4 groups and 20 spots on a given day my relative number would be 10(4) + 20 + 60. The graph shows the daily changes in sunspot activity. Current Cycle 24 was slightly unusual in that it sported two peaks. The largest, in April 2014, was preceded by an earlier peak in March 2012. Despite this scenario, Cycle 24 displayed the lowest peak since 1906. In July a reversed polarity spot group suggests the next cycle, #25, has begun. Having made that assertion, solar cycles do overlap. The Sun continues in solar minimum. The following data for spotless days as reported by Spaceweather.com: 2019 thru Aug 12 - 149 or 67%; 2018 = 221, or 61%; 2017 = 104, or 28%; 2016 = 32, or 9%.

Solar Spectrum in the Sky

by Francine Jackson

I hate thunderstorms. If I could, I'd throw myself under my bed until it was over. This isn't a leftover from childhood; it came at me as a teenager, and haunts me til this day. I still count the Mississippis just to make sure it isn't too close, and sigh with relief when it winds down.

However, occasionally, as the storm ends and we have just a few small raindrops left, the Sun will appear. Then, as soon as it is visible, I revert back to a kindergarten planetarium show I used to do in New York, pre total video projections, when it was myself in the middle of the room, with a microphone and a button, and many of the characters from Sesame Street projected as slides (remember them?). There, after the technicians finished spraying the audience with water from squirt guns, my button would project a rainbow, with Big Bird suddenly directing his friends and everybody in the room to look at it with wonder, after which Big Bird would tell us all how to find it: "Turn your back to the Sun, and you may see a rainbow!"

It isn't really that easy, as rainbows don't occur with each bout of rain: It only happens when the Sun reappears before the rain stops, as we need the raindrops to create the magnificent colors. We need the water droplets to reflect, refract, and disperse the light, making the beautiful rainbow arc, consisting of the primary and secondary colors, always in order, from red, orange, yellow, green, blue and violet. Occasionally, the hue indigo is added to make seven, courtesy of Sir Isaac Newton, who believed the number seven was necessary in Nature. To recall the order of color, you might remember the mnemonic ROY G BIV, which I learned as a child, courtesy Finnie, the Office Goldfish, in Jack and Jill Magazine.

Although we normally see the arc of color along the horizon, a rainbow can be a full circle. I was fortunate to see this one time while flying out of Detroit. As the plane rose, so did the rainbow, and the woman beside me – a stranger, of course – was pulled to the window to see this. And, yes, she was quite amazed – at least she said she was.

In addition, if you look carefully, you might often see the secondary rainbow, which is much dimmer than the primary one, as it is spread over a greater part of the sky. It is the result of a double reflection of sunlight within the water droplets. That is also why the colors are reversed, with violet on the top and red on the bottom.

Some of us were fortunate to observe both a primary and secondary rainbow during the last major thunderstorm at Seagrave Observatory. As ever, the sight was magnificent! Seeing a rainbow has to be one of Nature's most incredible visions. At times, it almost makes undergoing a truly scary rainfall worthwhile. In the words of Big Bird and his friends, "Wow! It's beautiful!"

Francine Jackson is a NASA Solar System Ambassador, writes the weekly newsletter for Ladd Observatory and teaches astronomy at the Community College of Rhode Island. See more at http://theskyscrapers.org/francine-jackson

Neptune at Opposition

by Jim Hendrickson

With Mars and Venus lost in the glare of the Sun, our attention this summer has been focused on Jupiter and Saturn. By late evening in September, our two large gas giants sink low in the southwest, giving way to a seemingly planetless void as the autumn constellations fill the sky.

Looking beyond Saturn, our solar system's fourth largest planet is the next to grace the sky. Throughout 2019, Neptune is located near the border of Aquarius and Pisces. Normally, star-hopping to targets in this devoid-of-bright-stars area of sky can be a challenge. However, this year Neptune's position makes it somewhat easier, notably because it spends the next several weeks within a degree of 4th magnitude Phi Aquarii.

To begin your journey to Neptune, begin at the Circlet asterism in Pisces. You can locate the Circlet below the Great Square of Pegasus. From the westernmost star in the Circlet, go south, about one-and-a-half Circlet diameters (roughly a binocular or finder field of view) to find Phi. Once you've located Phi, you're there! Neptune should already be in your low power field of view.

Phi Aquarii is an M giant, and its orange hue will be in striking contrast to blue Neptune, especially in larger telescopes. Be sure to look for Neptune on September 5-6, when it will be within 40 arcseconds of Phi Aquarii. The close separation combined with the contrasting colors should give the pair an almost Albireo-like appearance.

The full Harvest Moon lies just over 5 degrees to the southeast of Neptune on the 13th.

Jim Hendrickson is newsletter and web editor and has been a member for 20 years. See more at http://theskyscrapers.org/jim-hendrickson

NASA Night Sky Notes:

Spot the Stars of the Summer Triangle

By David Prosper

September skies are a showcase for the **Summer Triangle**, its three stars gleaming directly overhead after sunset. The **equinox** ushers in the official change of seasons on September 23. **Jupiter** and **Saturn** maintain their vigil over the southern horizon, but set earlier each evening, while the terrestrial planets remain hidden.

The bright three points of the **Summer Triangle** are among the first stars you can see after sunset: Deneb, Vega, and Altair. The Summer Triangle is called an **asterism**, as it's not an official constellation, but still a striking group of stars. However, the Triangle is the key to spotting multiple constellations! Its three stars are themselves the brightest in their respective constellations: Deneb, in Cygnus the Swan; Vega, in Lyra the Harp; and Altair, in Aquila the Eagle. That alone would be impressive, but the Summer Triangle also contains two small constellations inside its lines, Vulpecula the Fox and Sagitta the Arrow. There is even another small constellation just outside its borders: diminutive Delphinus the Dolphin. The Summer Triangle is huge!

The **equinox** occurs on September 23, officially ushering in autumn for folks in the Northern Hemisphere and bringing with it longer nights and shorter days, a change many stargazers appreciate. Right before sunrise on the 23rd, look for Deneb - the Summer Triangle's last visible point - flickering right above the western horizon, almost as if saying goodbye to summer.

The Summer Triangle region is home to many important astronomical discoveries. Cygnus X-1, the first confirmed black hole, was initially detected here by x-ray equipment on board a sounding rocket launched in 1964. NASA's Kepler Mission, which revolutionized our understanding of exoplanets, discovered thousands of planet candidates within its initial field of view in Cygnus. The Dumbbell Nebula (M27), the first planetary nebula discovered, was spotted by Charles Messier in the diminutive constellation Vulpecula way back in 1764!

Planet watchers can easily find **Jupiter** and **Saturn** shining in the south after sunset, with Jupiter to the right and brighter than Saturn. At the beginning of September, Jupiter sets shortly after midnight, with Saturn following a couple of hours later, around 2:00am. By month's end the gas giant duo are setting noticeably earlier: Jupiter sets right before 10:30pm, with Saturn following just after midnight. Thankfully for planet watchers, earlier fall sunsets help these giant worlds remain in view for a bit longer. The terrestrial planets, Mars, Venus, and Mercury, remain hidden in the Sun's glare for the entire month.

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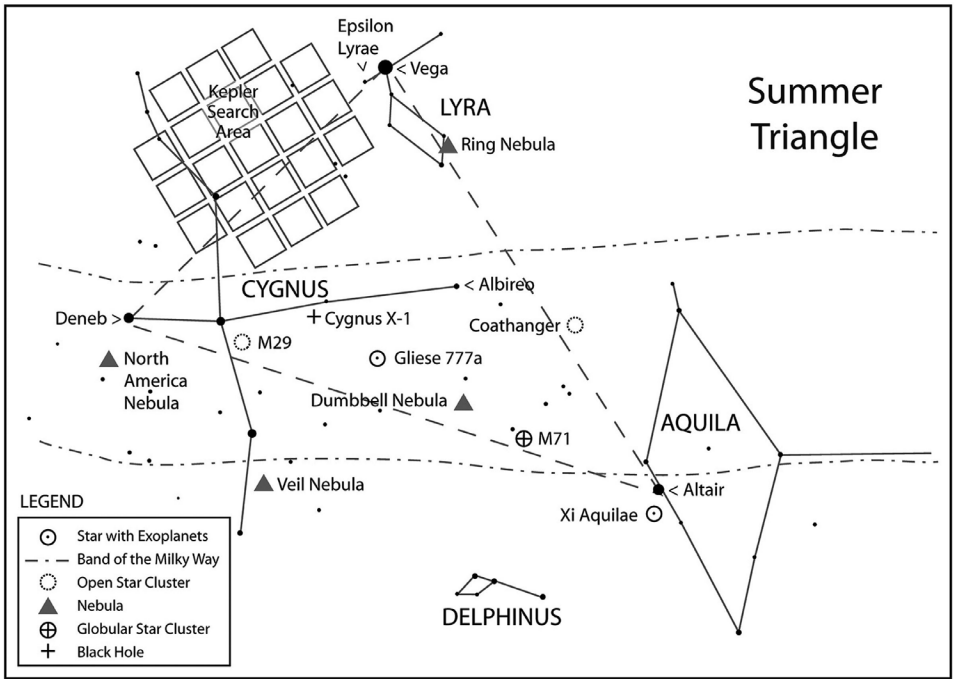
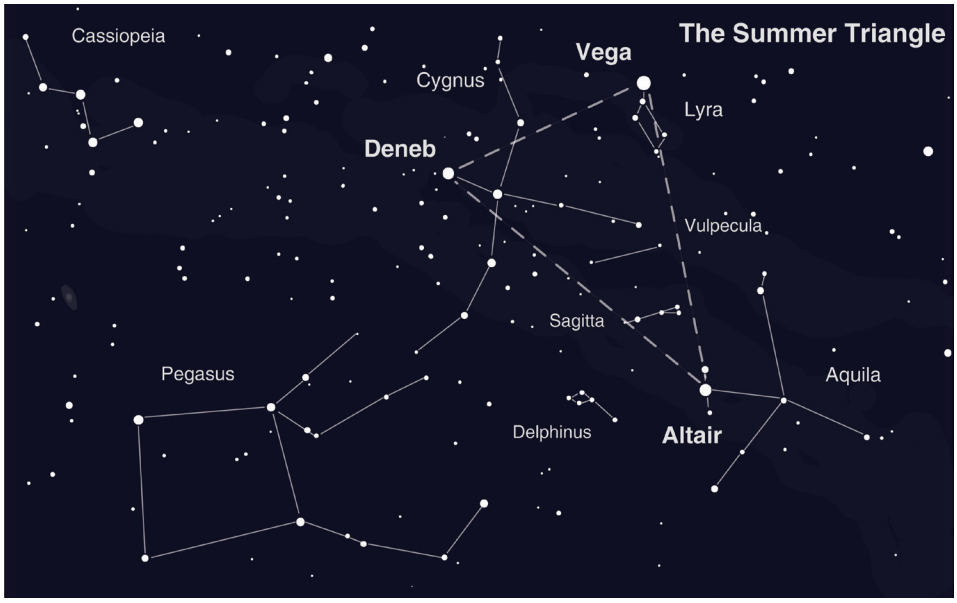


Once you spot the Summer Triangle, you can explore the cosmic treasures found in this busy region of the Milky Way. Make sure to "Take a Trip Around the Triangle" before it sets this fall! Find the full handout at bit.ly/TriangleTrip



This wider view of the area around the Summer Triangle includes another nearby asterism: the Great Square of Pegasus.

Globule Cluster in Sagitta: Messier 71 (NGC 6838)

by Glenn Chaple for LVAS

Mag: 8.2 Size: 7.2′

For the second consecutive month, the Observer's Challenge features a Messier object – this time, M71 in the constellation Sagitta, the Arrow. An 8th magnitude object, it's much fainter than last month's Challenge, the open cluster M11 in Scutum.

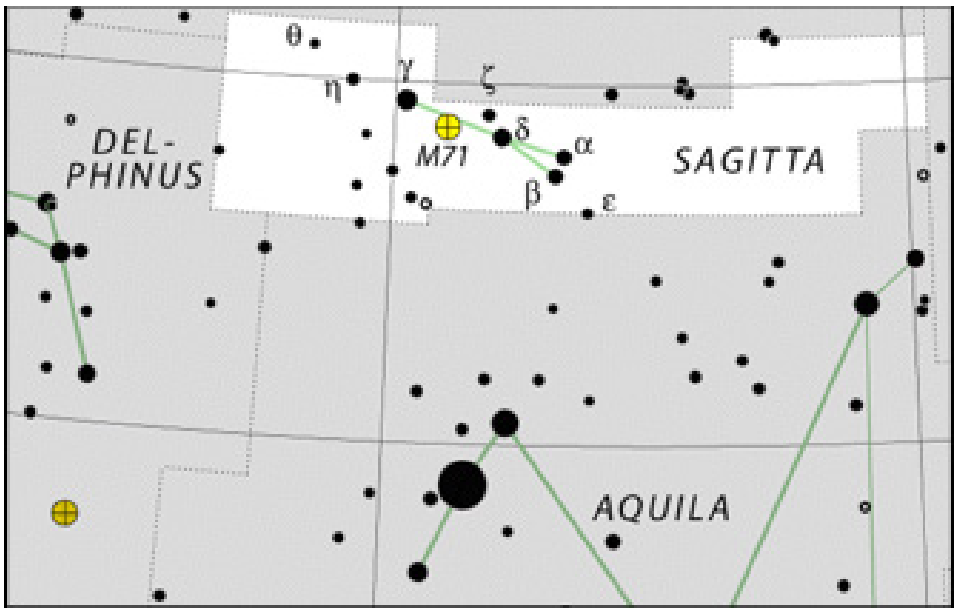
M71 was discovered some time in 1745 or 1746 by the Swiss mathematician/astronomer Philippe Loys de Chéseaux. When Charles Messier learned of its independent discovery by fellow comet hunter Pierre Méchain in the summer of 1780, he observed the object for himself and entered it into his catalog.

Finding M71 is an easy task, especially once you locate Sagitta. This little constellation lies 10 degrees north of the first magnitude star Altair in Aquila. Once you've found Sagitta, make a medium power (50-75X) search of an area slightly south of the midpoint between gamma (γ) and delta (δ) Sagittae. As mentioned earlier, M71 is rather faint. Sweep slowly and make your observation from a reasonably dark site. I first saw M71 on a clear summer evening in 1977, using a 3-inch f/10 reflector, and then re-observed it 20 years later with a 4-inch rich-field scope. In both instances, a magnification of around 60X was used, and the cluster appeared as a faint unresolved blob. Recently, I returned with a 10-inch f/5 Dob and a magnifying power of 140X. This time, M71 was resolved, with a dozen of so magnitude 12-13 stars gleaming through the haze.

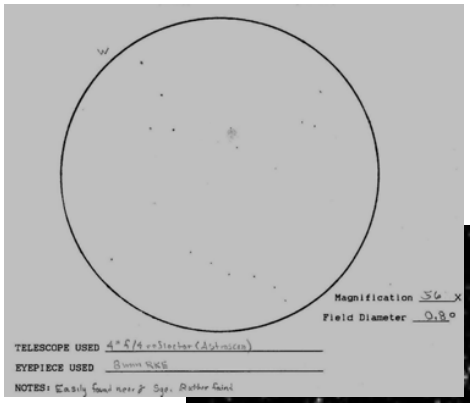
As late as the 1970s, astronomers debated as to whether M71 was a rich open cluster like M11 or a sparse globular cluster similar to M68 in Hydra. The consensus today is that M71 belongs to the latter group. Its 13,000 light-year distance translates to an true diameter about 27 light years.

After paying your respects to M71, I advise you to rest your eyes. Next month, we return to the "faint fuzzies!"

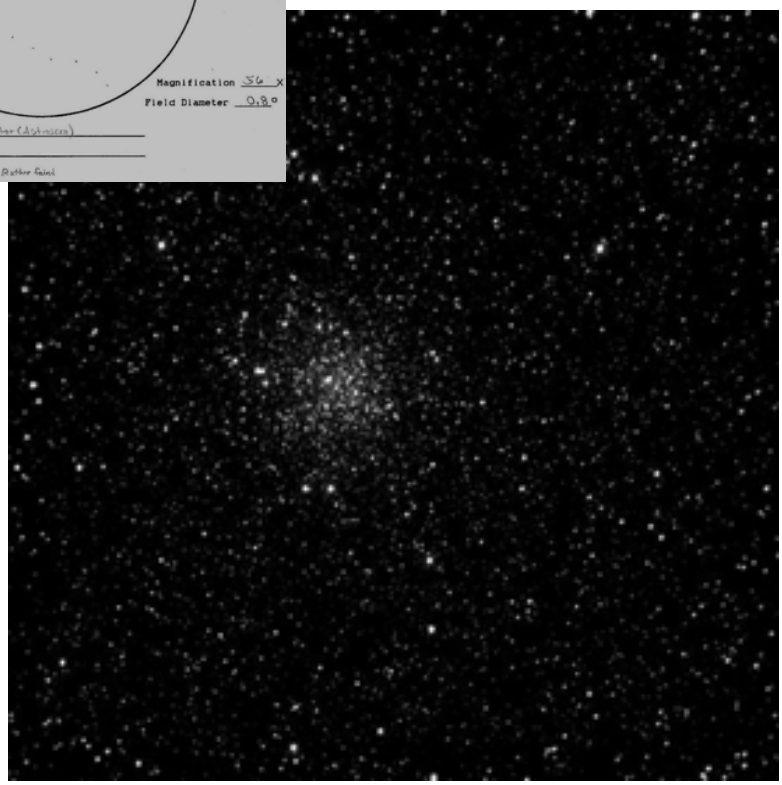
The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either Roger Ivester (rogerivester@me.com) or Fred Rayworth (queex@embarqmail.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to rogerivester.com/category/observers-challenge-reports-complete.



M71 Finder Chart (IAU and Sky & Telescope)



M71 (Sketch by Glenn Chaple)



M71 (Image by Mario Motta, MD)

The Sun, Moon & Planets in September

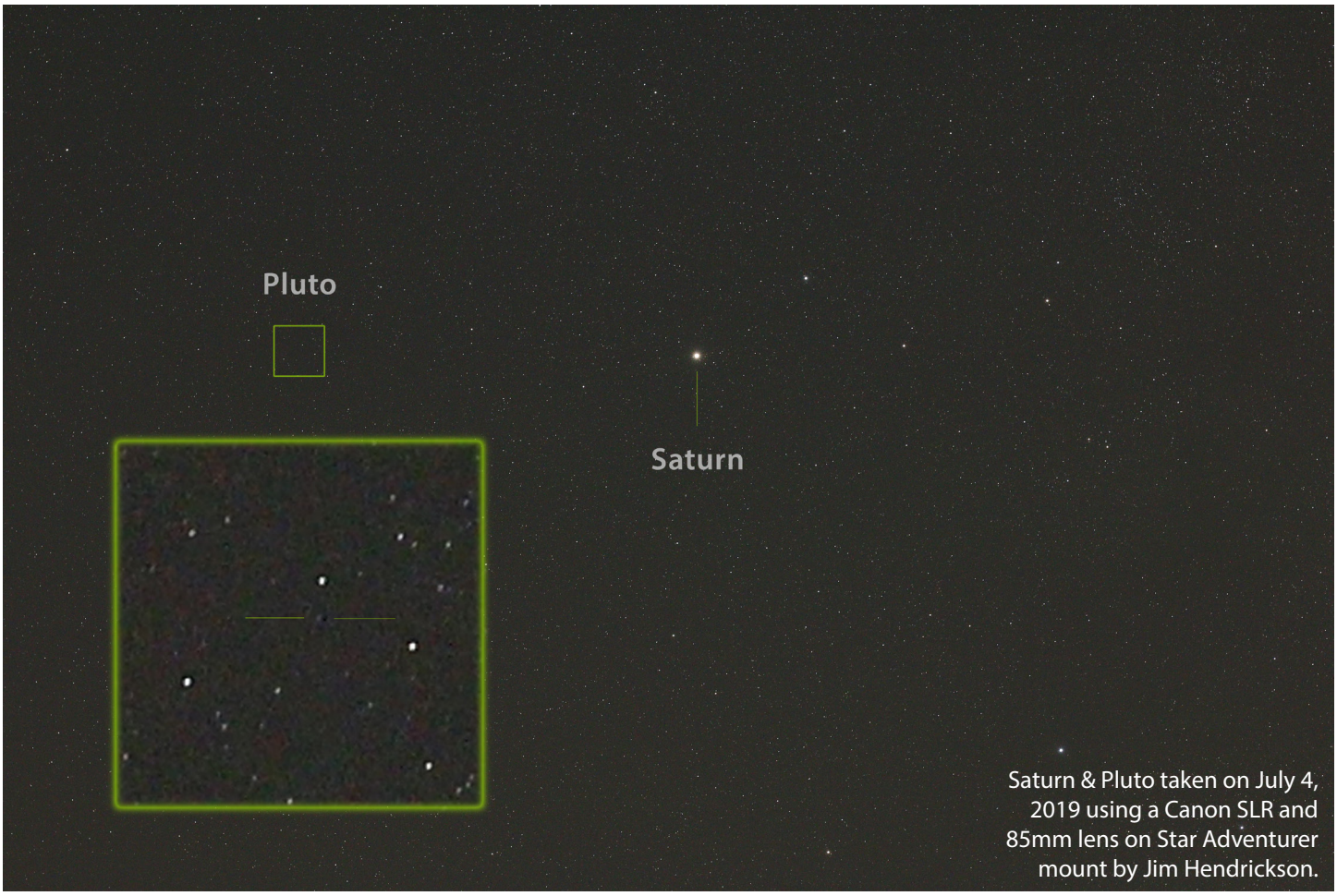
This table contains the ephemeris of the objects in the Solar System for each Saturday night in September 2019. Times in Eastern Daylight Time (UTC-4). Ephemeris times are for Seagrave Observatory (41.845N, 71.590W).

Object	Date	RA	Dec	Const	Mag	Size	Elong	Phase(%)	Dist(S)	Dist(E)	Rise	Transit	Set
Sun	**7**	11 01.4	6 15.2	Leo	-26.8	1904.1	-	-	-	1.01	06:17	12:44	19:10
	14	11 26.6	3 36.3	Leo	-26.8	1907.6	-	-	-	1.01	06:24	12:41	18:58
	21	11 51.6	0 54.2	Vir	-26.8	1911.2	-	-	-	1	06:32	12:39	18:46
	28	12 16.8	-1 49.3	Vir	-26.8	1914.8	-	-	-	1	06:39	12:37	18:33
Moon	**7**	17 35.5	-22 16.5	Oph	-12.0	1854.7	100° E	59	-	-	15:26	20:09	00:51
	14	23 28.6	-9 11.1	Aqr	-12.5	1770.5	175° E	100	-	-	19:36	01:31	07:34
	21	4 54.9	19 12.6	Tau	-12.1	1841.2	103° W	62	-	-	22:29	06:02	13:41
	28	11 41.3	6 08.2	Vir	-7.9	1995.9	12° W	1	-	-	06:11	12:41	18:58
Mercury	**7**	11 14.0	6 38.5	Leo	-1.8	4.9	3° E	99	0.38	1.38	06:32	12:59	19:24
	14	11 59.6	1 07.1	Vir	-0.9	4.9	9° E	97	0.42	1.38	07:10	13:16	19:21
	21	12 41.6	-4 14.1	Vir	-0.5	5.0	14° E	93	0.45	1.36	07:44	13:31	19:16
	28	13 21.0	-9 12.7	Vir	-0.2	5.2	18° E	88	0.46	1.31	08:13	13:42	19:10
Venus	**7**	11 27.7	5 00.1	Leo	-3.8	9.9	7° E	99	0.72	1.71	06:50	13:11	19:30
	14	11 59.5	1 29.1	Vir	-3.8	10.0	8° E	99	0.72	1.70	07:07	13:15	19:22
	21	12 31.2	-2 04.9	Vir	-3.8	10.0	10° E	98	0.72	1.69	07:24	13:19	19:13
	28	13 03.0	-5 37.7	Vir	-3.8	10.1	12° E	98	0.72	1.67	07:41	13:23	19:05
Mars	**7**	10 57.4	7 49.3	Leo	1.7	3.5	2° W	100	1.67	2.67	06:09	12:39	19:09
	14	11 14.0	6 04.4	Leo	1.7	3.5	4° W	100	1.66	2.67	06:04	12:28	18:52
	21	11 30.5	4 17.6	Leo	1.8	3.5	6° W	100	1.66	2.66	05:59	12:17	18:34
	28	11 47.0	2 29.5	Vir	1.8	3.5	9° W	100	1.66	2.64	05:55	12:06	18:17
1 Ceres	**7**	16 21.4	-22 56.8	Sco	8.9	0.4	83° E	97	2.84	2.78	13:28	18:01	22:35
	14	16 28.9	-23 26.1	Oph	8.9	0.4	78° E	97	2.85	2.88	13:10	17:41	22:13
	21	16 37.0	-23 54.6	Oph	9.0	0.4	73° E	97	2.85	2.97	12:53	17:22	21:51
	28	16 45.7	-24 21.8	Oph	9.1	0.4	69° E	97	2.86	3.07	12:36	17:03	21:30
Jupiter	**7**	16 57.4	-22 19.9	Oph	-2.0	38.2	91° E	99	5.27	5.15	14:00	18:37	23:13
	14	17 00.1	-22 24.9	Oph	-2.0	37.5	85° E	99	5.27	5.25	13:36	18:12	22:48
	21	17 03.3	-22 30.5	Oph	-1.9	36.7	79° E	99	5.26	5.36	13:12	17:48	22:23
	28	17 07.0	-22 36.4	Oph	-1.9	36.0	73° E	99	5.26	5.46	12:49	17:24	21:59
Saturn	**7**	19 00.8	-22 28.8	Sgr	0.4	17.4	120° E	100	10.04	9.50	16:04	20:39	01:15
	14	19 00.4	-22 30.1	Sgr	0.4	17.2	113° E	100	10.04	9.61	15:36	20:12	00:47
	21	19 00.4	-22 30.8	Sgr	0.4	17.0	106° E	100	10.04	9.72	15:08	19:44	00:20
	28	19 00.7	-22 31.1	Sgr	0.5	16.8	99° E	100	10.04	9.83	14:41	19:17	23:52
Uranus	**7**	2 16.8	13 08.9	Ari	5.7	3.7	128° W	100	19.83	19.20	21:08	03:58	10:48
	14	2 16.2	13 05.7	Ari	5.7	3.7	135° W	100	19.83	19.11	20:40	03:30	10:20
	21	2 15.4	13 01.8	Ari	5.7	3.7	142° W	100	19.83	19.03	20:12	03:02	09:52
	28	2 14.6	12 57.4	Ari	5.7	3.7	149° W	100	19.83	18.97	19:40	02:29	09:19
Neptune	**7**	23 15.3	-5 57.0	Aqr	7.8	2.4	177° W	100	29.93	28.93	19:13	00:53	06:34
	14	23 14.6	-6 01.6	Aqr	7.8	2.4	176° E	100	29.93	28.93	18:45	00:25	06:05
	21	23 13.9	-6 06.1	Aqr	7.8	2.4	169° E	100	29.93	28.95	18:17	23:57	05:37
	28	23 13.2	-6 10.4	Aqr	7.8	2.4	162° E	100	29.93	28.98	17:49	23:29	05:08
Pluto	**7**	19 30.3	-22 19.4	Sgr	14.3	0.2	127° E	100	33.88	33.26	16:32	21:09	01:45
	14	19 30.0	-22 20.6	Sgr	14.3	0.2	120° E	100	33.88	33.37	16:05	20:41	01:17
	21	19 29.7	-22 21.7	Sgr	14.3	0.2	113° E	100	33.88	33.48	15:37	20:13	00:49
	28	19 29.6	-22 22.5	Sgr	14.3	0.2	106° E	100	33.89	33.60	15:09	19:46	00:22

Planetary nebula NGC 6781 in Aquila by Steve Hubbard using ZWO 294 on a 14-inch SCT.

INFLOWS	
Astronomical League Membership Co...	90.00
Donation	
Donation for Capital Improvements	2,865.00
Misc Donation	1,452.56
Tracy Prell Birthday Fundraiser	750.33
TOTAL Donation	5,067.89
Dues	
Family	960.00
Junior	30.00
Regular	1,450.00
Senior	725.00
TOTAL Dues	3,165.00
Misc Income	
Sale of Items	140.00
TOTAL Misc Income	140.00
Star Party Donations	100.00
TOTAL INFLOWS	**8,562.89**

OUTFLOWS	
Astro Assem Exp	
Hall Rental	200.00
Raffle	5.00
TOTAL Astro Assem Exp	205.00
Astronomical League Membership Ex...	100.00
Corporation, State Fee	22.00
Domain Name	155.96
Misc Expenses	34.63
PayPal Fee	62.83
Trustee Expense	
Property Maintenance	2,507.03
TOTAL Trustee Expense	2,507.03
Utilities	
Electric	174.62
Internet	319.96
Porta-John	475.00



Saturn & Pluto taken on July 4, 2019 using a Canon SLR and 85mm lens on Star Adventurer mount by Jim Hendrickson.

AstroAssembly 2019

Saturday, October 5th

47 Peeptoad Road, North Scituate, Rhode Island

Note: We are not holding a Friday evening program this year. Instead, we are expanding our Saturday morning program to include informal talks. If you would like to give a short talk on Saturday morning, please contact Bob Horton at Robert_Horton@Brown.edu.

All Day Saturday

at Seagrave Observatory

Poster Session, Swap Table (please bring your own table), Solar Viewing, Astrophotography Contest, Homemade Telescopes (bring yours), and the Famous Astro Bake-off Contest.

10:30 AM **Steve Hubbard, President, Skyscrapers, Inc. -** "Southern Skies: A trip below the equator to see an eclipse, the southern Milky Way and even a llama or two"

Noon **Lunch at the Skyscrapers Grill**

1:15 PM **Roger Fu, Harvard University -** "Stars Through the Araucanias: Mapuche-Pewenche Ethnoastronomy"

2:30 PM **Ed Ting, New Hampshire Astronomical Society -** "Chile 2017-2018 Astronomical Trip"

3:45 PM **Prathima Muniyappa, MIT Space Exploration Initiative, Indigenous Cosmologies Working Group - "**We Have Always Had Our Eyes Turned Skyward - Art, Culture and Inclusion in the Democratization of Space"

Saturday Evening

at North Scituate Baptist Church, 619 W Greenville Rd (Route 116), North Scituate, RI 02857

Reception & Antipasto Bar (pre-registration required)

Evening Banquet – Italian-style Buffet Dinner catered by Quik Stop Deli (pre-registration required)

Words of Welcome, Awards, Raffle Drawing

7:30 PM **Professor John Mustard, Department of Earth, Environmental and Planetary Sciences, Brown University -** "What Will Mars 2020 Tell Us About the Planets?"

Times of specific activities are subject to change. For up-to-date program information, see http://www.theSkyscrapers.org/astroassembly2019

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:** 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.

_____ Registrations x $25 each = $ _____

_____ Registrations (Skyscrapers Member) x $20 each = $ _____

_____ Registrations (Children under 14) Free _____

_____ Banquet Tickets x $25 each = $ _____

_____ Banquet Tickets (Children under 14) x $15 each = $ _____

Total = $ _____

Name _____

Address _____

_____

Email _____

Send completed form and check (Made payable to Skyscrapers Inc.) to:

Linda Bergemann
41 Ross Hill Road
Charlestown, RI 02813-2605

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www.theSkyscrapers.org

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SKYSCRAPERS INC.

47 Peeptoad Road
North Scituate, Rhode Island 02857