



IO - September 2023

Eugene Astronomical Society, PO Box 591, Lowell, OR 97452

www.eugeneastro.org

Annual Club Dues \$25

President: Andrew Edelen 618-457-3331

Secretary: Randy Beiderwell 541-342-4686

Additional Board members:

Dan Beacham, Ken Martin, Robert Asumendi.

EAS is a proud member of The Astronomical League



Next Meeting Thursday, September 21st, 7:00 p.m.

Extraterrestrial Life in the Solar System: Exploring Jupiter's Icy Moons

by Bernard Bopp, Professor of Astronomy Emeritus

If we wish to identify extraterrestrial life in our solar system, a reasonable search strategy would be to “follow the water.” This strategy has shaped searches on Mars, where ancient riverbeds and surface minerals formed in water show that Mars was once Earthlike, with a much thicker atmosphere, flowing water, and warmer temperatures than today. But there are several other worlds in our solar system with deep subsurface oceans, opening the possibility that life might evolve in many places where liquid water exists.

The talk will focus on three of Jupiter’s “icy moons” — Europa, Ganymede, and Callisto, frozen-surface worlds with deep oceans below. Two exciting spacecraft missions will head toward Jupiter to explore these ice/ocean worlds:

- JUICE (Jupiter Icy Moons Explorer), launched by the European Space Agency in April 2023, and arriving at Jupiter in 2031.

- Europa Clipper, a NASA mission scheduled for launch in October 2024, arriving at Jupiter in 2030.

The presentation will highlight spacecraft designs and the science expected from both missions. It is appropriate for general, non-scientific audiences.



Artist's conception of JUICE approaching Jupiter.

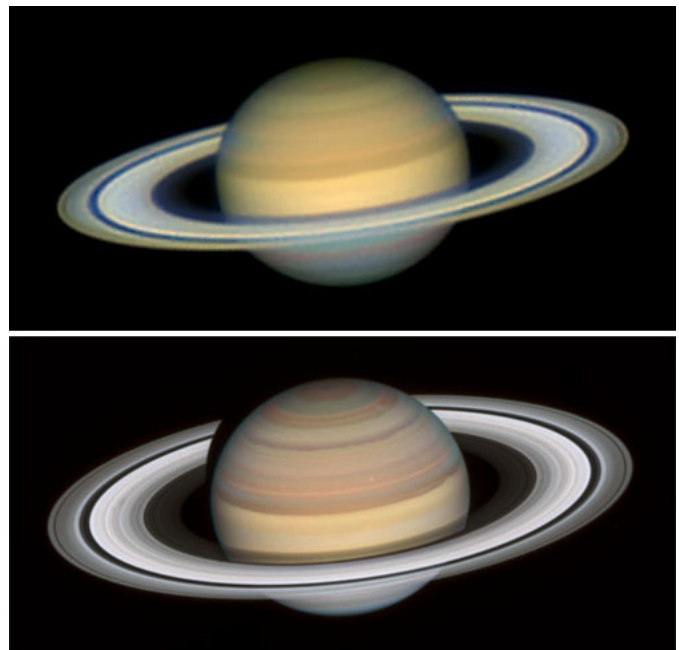
August Meeting Report

What's Up by Jerry Oltion

Our August 17th meeting started with Jerry Oltion doing the “What’s Up” presentation. Jerry used the SkySafari planetarium program to show us what would be a typical set of targets for him if he went out observing that night. He started at the zenith, which was in Hercules, which led to M13, one of the nicest globular clusters in the sky. From there he went to Draco to test the seeing on Nu and Mu Draconis, a wide and a tight pair of double stars. He pointed out a Draco galaxy triplet (NGC 5981, 5982, and 5985), of which NGC 5981 is only visible when the transparency is good. Those tests determine a lot of what else to look for over the course of the evening, since seeing and transparency affect the smaller and dimmer objects respectively. Jerry proceeded down the Milky Way from Cepheus through Cygnus and Aquila to Sagittarius and Scorpius, hitting the major highlights along the way.

Then came Jeff Phillips’s presentation on planetary imaging. Jeff talked about his early attempts at astrophotography and how he learned methods for producing better and better photos. He takes many exposures and uses software to stack them into a single composite image that’s sharper than any of the single images. He showed us many examples that revealed detail on Mars, Jupiter, and Saturn that rivaled the resolution achieved by the Hubble Space Telescope. Jeff’s images have been published in *Sky & Telescope* magazine, and have graced our email list many times as well. We’re lucky to have such a talented planetary astrophotographer in our midst. Thank you, Jeff, for such an inspiring presentation!

Planetary Imaging by Jeff Phillips



Jeff vs. Hubble. Which is which?
Images © by Jeff Phillips and NASA

Next First Quarter Friday: September 22nd

Our August 25th star party was smoked out, as was our Saturday backup. Our next First Quarter Friday star party will be September 22nd, by which time we hope the first of the autumn rains will have put out the fires and cleaned the air. First Quarter Fridays are laid-back opportunities to do some observing and promote astronomy at the same time. Mark your calendar and bring your scope to the College Hill Reservoir (24th and Lawrence in Eugene) and share the view with whoever shows up. Here’s the schedule for the remainder of 2023. Star parties start at dusk or 6:00, whichever is later. (7:30 on 9/22)

September 22 (Moon 53% lit)
December 22 (Moon 84% lit)

October 20 (Moon 38% lit)

November 17 (Moon 24% lit)

EWEB's Plans for College Hill Reservoir

The Eugene Water and Electric Board held an ice cream social and information session at the College Hill Reservoir last week to let people know what the future holds for the reservoir. This is an email recap from EWEB:

Recap: College Hill Reservoir Ice Cream Social

Dear Neighbor,

Thank you to everyone who came out to the Ice Cream Social at the College Hill Reservoir last Thursday. We enjoyed meeting you and talking about the College Hill Reservoir Replacement Project. For those who were unable to make it, here are some of the topics discussed:

Timeline. EWEB is planning to drain the reservoir by the end of this year. The public will continue to have access to the top of the reservoir until we are ready to begin demolition in mid to late spring 2024.

Tank siting and design. Final tank siting/design is scheduled to wrap up this fall. Right now, our hope is that the two new circular tanks will fit within the footprint of the existing active reservoir. We will share updates as design progresses.

Public space. Space not occupied by the new tanks will be available for public use. Once design is underway and the footprint of the tanks is established, we will reach out to the public for help developing a landscape and recreation plan for the remainder of the site.

Public input opportunities:

Historic mitigation. Next month, we will hold an event to discuss ways we can mitigate the removal of the reservoir that provide the greatest public benefit. An invite with additional details will be distributed soon.

Landscaping and recreation. Next year, once the tank siting is complete, we will ask for your help to develop a plan for landscape restoration, screening of the new tanks, and low-impact recreation facilities that can be enjoyed by everyone, while aligning with broader community values such as responsible use of funds, public safety, and ease of maintenance.

Why College Hill? Why now? The existing College Hill Reservoir cannot be retrofitted to meet current seismic standards. It needs to be replaced with resilient water storage tanks that are built with modern, earthquake-conscious construction techniques. EWEB relies on the storage at College Hill to deliver safe and reliable drinking water to all residents of Eugene and maintain water pressure for fire suppression.

Project Overview Slideshow

View photos from the Ice Cream Social event and learn more about the project in this video slideshow:

<https://www.youtube.com/watch?v=QYJvR6WW-cs>

Many other frequently asked questions are posted online here: eweb.org/CollegeHill.

During the event, we received many comment cards with great insights on how the site is currently used and enjoyed. All comments have been recorded in our system. This feedback is important, and it will be used to shape the future shared spaces on the site.

Thank you again to all those who came out and all those with an interest in College Hill. We look forward to working with you on this important project.

-Your Water Storage Team

Laura Farthing, Senior Engineer - Water

Wally McCullough, Water Engineering Supervisor

Jen Connors, Communications Supervisor

Claire Wray, Communications Specialist

Looking ahead

The Board of Commissioners will hear an update on the College Hill Reservoir Replacement project at their Sept. 5 meeting. An agenda and more information will be posted here:

<https://www.eweb.org/your-public-utility/board-of-commissioners/public-meetings>

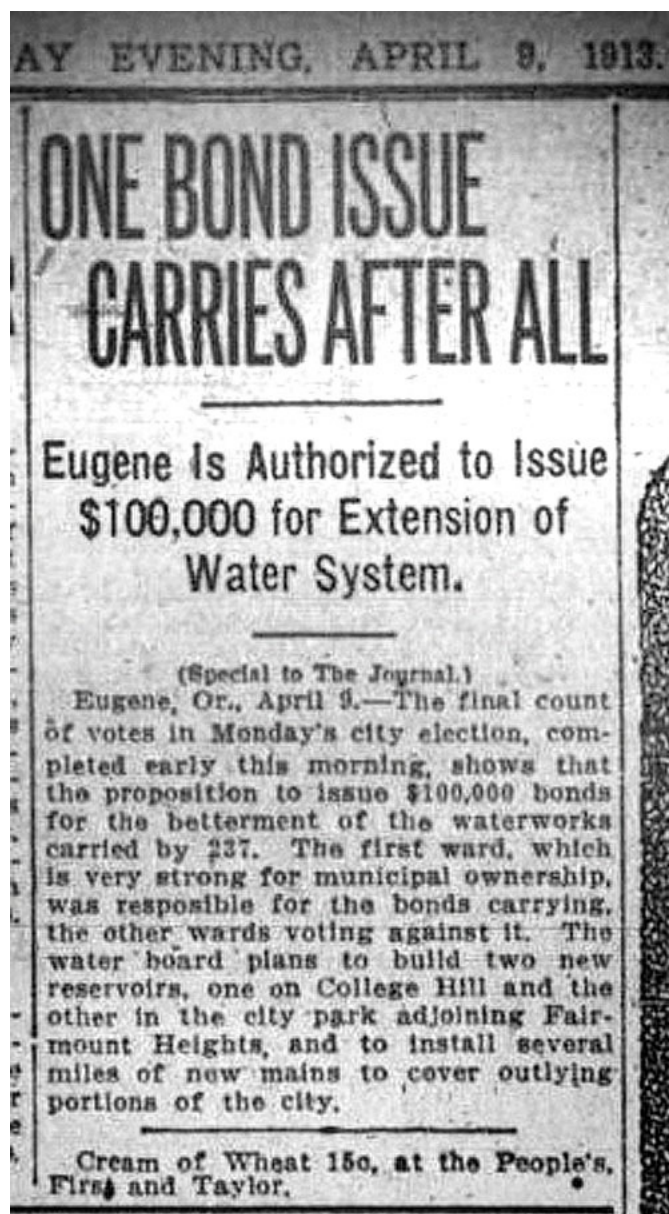
Historic Mitigation kickoff in mid-September. More information coming soon.

Contact us with questions

If you have questions or input, please don't hesitate to reach out to the project team at 541-685-7899 or water.storage@eweb.org.

Bill Murray found a great historical document with tons of photos of the construction of the College Hill Reservoir. You can download it here:

https://www.eweb.org/documents/water-quality/HRA3083_CollegeHillRes_ILS_20200501.pdf



Amy Baker found this clipping from the April 9, 1913
Oregon Daily newspaper.



This photo, from the document that Bill Murray found, shows the reservoir site in December of 1938, before construction began.



In 1972 the reservoir was still at the edge of town and light pollution wasn't nearly as bad as now. Mel Bartels took this photo of a comet (center — zoom in) that was visible above town. The timing would make this Comet Bradfield.

Photo © by Mel Bartels.

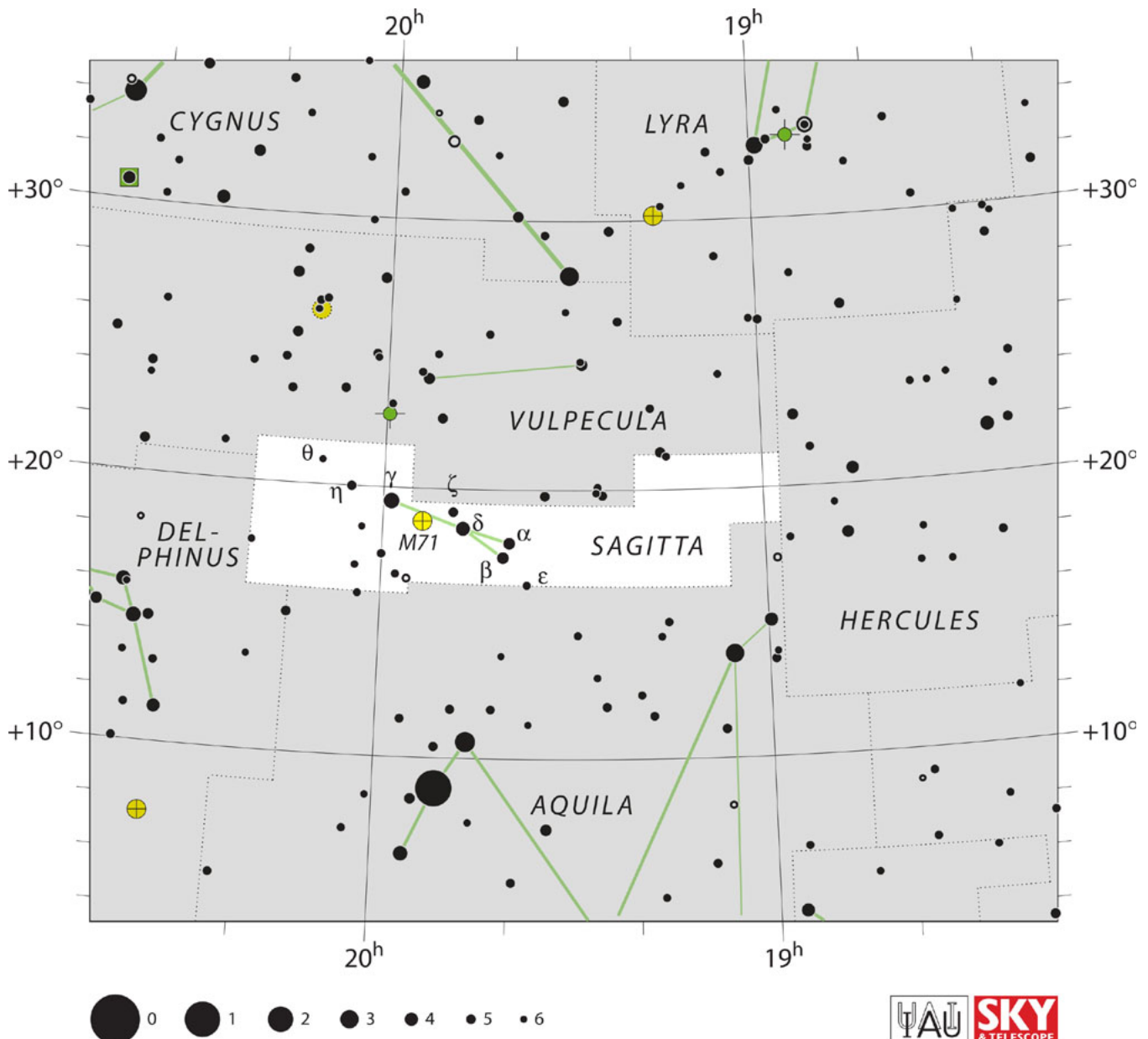


Constellation of the Month: Sagitta

by Andy Edelen

One of two small constellations (the other being Vulpecula the Little Fox) lying between the southern reaches of Cygnus and the trio of bright stars that mark the tail of Aquila the Eagle, Sagitta the Arrow is often noticed by amateur astronomers but rarely explored in depth. Yet this tiny constellation — 86th of the 88 constellations in area — was one the original 48 constellations plotted on the star charts of the 2nd-Century astronomer Ptolemy, and the constellation's modern borders contain a staggering variety of interesting objects for optics of all sizes and types.

Sagitta even had a role in one of the major constellation myths, albeit a small one: it was a stray arrow fired by Hercules at the Stymphalian Birds during the Sixth of his Twelve Labours. (The Stymphalian Birds are represented by Cygnus, Aquila and Lyra, the latter often imagined as a vulture.) In some variants of this mythology, the Arrow killed Aquila, who was the Eagle tasked with plucking out the liver of



Sagitta, as seen on modern star charts. Courtesy *Sky & Telescope* and IAU.

Prometheus every day; Prometheus' crime was the giving of the Gods' knowledge to humanity.

In Chumash (California) lore, Sagitta, parts of Cygnus, and Delphinus represented a horde of monsters, past which souls would travel on their way to the Land-Of-The-Dead (possibly in Aquila). In Chinese lore, Sagitta (with Rho Aquilae) formed a military banner which accompanied a snare drum formed by Altair and its two flanking stars.

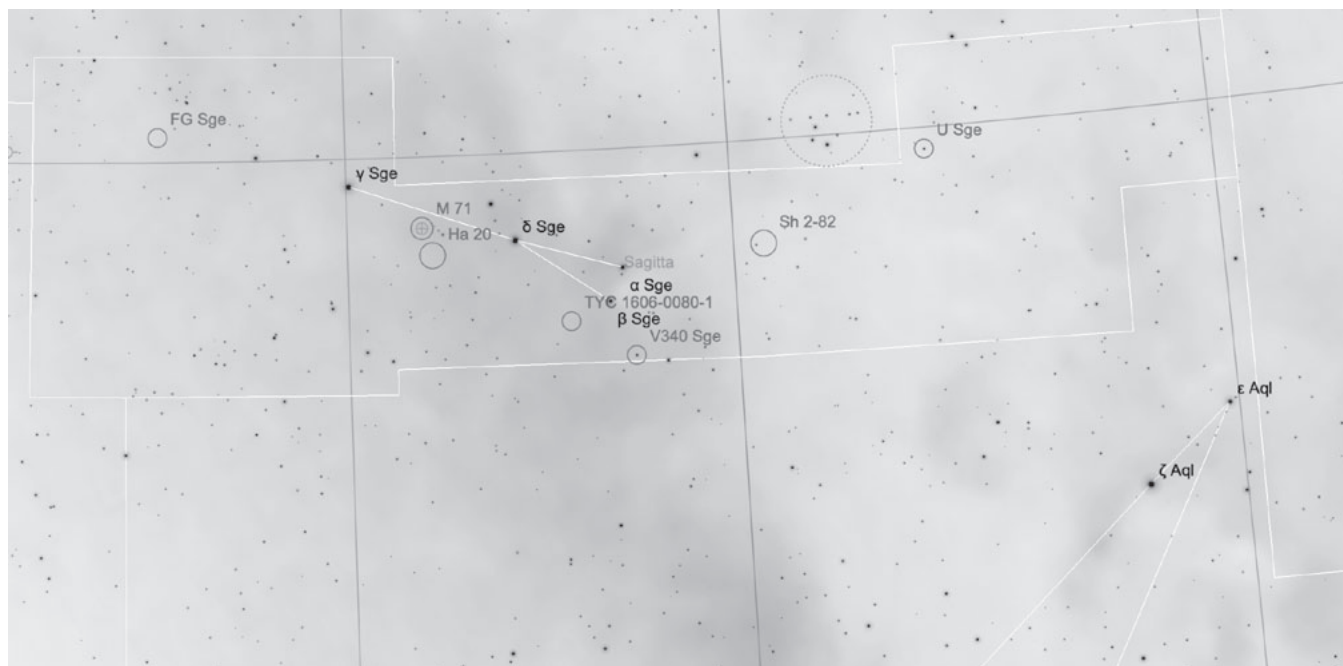
Although it's often pronounced as in the first part of "Sagittarius" — the Archer, of course — Sagitta is more-formally pronounced to rhyme with "fajita" (only with the j-sound pronounced). Note also that the formal, IAU-approved abbreviation for Sagitta is *Sge*, whereas that of Sagittarius is *Sgr*. This is due to the fact that the IAU based their abbreviations on the genitive form of the constellation's name — i.e. *Sagittae* ("of Sagitta") vs. *Sagittarii* ("of Sagittarius", with the double *-ii* ending discarded for the abbreviations' sake.) Everyone remembers their Greek and Latin, right?

Some of the richest Milky Way clouds pass through Sagitta, making the four-star asterism comprising the constellation's arrow shape more difficult to discern; the four primary stars range from magnitudes 3.5 to 4.4. Curiously, Alpha Sagittae is one of the two 4.4-magnitude stars (its Arabic name, *Sham*, means "Arrow," although it also sums up its status as the constellation's Alpha star). It's this arrow pattern that is our naked-eye target for September. Can it be seen from the College Hill Reservoir?

Among Sagitta's many deep-sky wonders is one Messier object: **M71**, our target for binoculars this month. M71's classification was long the subject of speculation; was it a very rich open cluster? A very loose globular? Some intermediary type? It had characteristics of all three possibilities. Current consensus is that M71 is a very loose globular cluster, and one of the nearest to the earth.

M71 is found easily in binoculars, halfway between Gamma and Delta Sge. It appears as a small, even glow set amid a glittering Milky Way field. In a mid-sized telescope, M71 appears similar to M4, with a brighter, looser central region and many far-flung outlier stars resolved.

Just under a half-degree south-southeast of M71 lies our target for 2-inch telescopes this month, which is also visible in a binocular view of M71. This is the open cluster **Harvard 20**, a loose agglomeration of some thirty stars in a 7' x 4' area. H20 is one of the few Northern Hemisphere objects among the 21 members of the Harvard open-cluster catalogue, compiled in 1930 by Harlow Shapley from data compiled at Harvard University.



This month's highlighted challenge objects, depicted at 11 PM on September 15th. V340 Sge refers to Herschel 84; TYC 1606-0080-1 marks the location of the Necklace Nebula. Chart adapted from *Sky Safari 5 Pro*.

H20 appears in small telescopes and binoculars as a faint patch of light with a pair of 9th-magnitude stars shining through. In larger optics, the cluster may disappear among the rich Milky Way background; wide fields are necessary to see the cluster as a unified object.

Given how dense the Milky Way is through this part of the sky, it's not surprising that Sagitta contains a number of unusual stars; three of these are our targets for 4-, 6-, and 8-inch telescopes. The eclipsing binary star **U Sagittae** is our object for 4-inch scopes this month. It's an Algol-type star with a very short variability period — 3.38 days — over which it drops from a maximum of magnitude 6.6 to a 9.2-magnitude minimum. (This variability can even be tracked using binoculars.) Remarkably, the minimum brightness only lasts for about 100 minutes per cycle! The primary of the pair is a bluish color, the secondary a yellow subgiant.

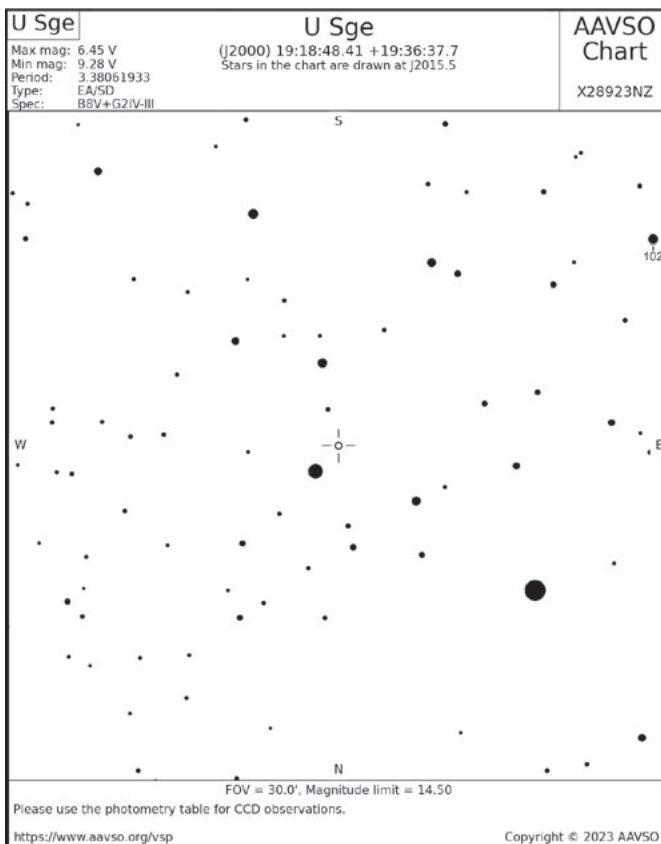
Find U Sge 1.5 degrees west of the Coathanger Cluster in neighboring Vulpecula, or 1.75 degrees south-southeast of the eruptive variable star 1 Vulpeculae.

Moving closer to the constellation's arrow pattern brings us to our target for 6-inch scopes, the beautiful color-contrastive double star **Herschel 84** (a.k.a. H N 84). Sagitta's finest double, Herschel 84 consists of a deep orange 6.5-magnitude primary star and an 8.9-magnitude blue secondary, separated by 28 arcseconds. If you want a suitable "yardstick" for measuring how large half an arcminute is, Herschel 84 is a pretty good estimate. Herschel 84 is a suitable subject for smaller optics, but a 6-inch will emphasize the stars' colors. Look for this lovely double 1.5 degrees south of Alpha Sge.

Our third stellar deep-sky target for this month is one of the most unusual stars ever observed, and yet it may be indicative of the aging processes of half of the stars in the universe. **FG Sagittae** was a hot blue variable supergiant star when first discovered back in 1943; in the eighty years since, the star has transformed into a yellow Sun-like star and then to its current state, an eruptive variable K-type orange star with huge brightness outbursts. To make things even more interesting, it's also the central star of the ridiculously-faint planetary nebula Henize 1-5.

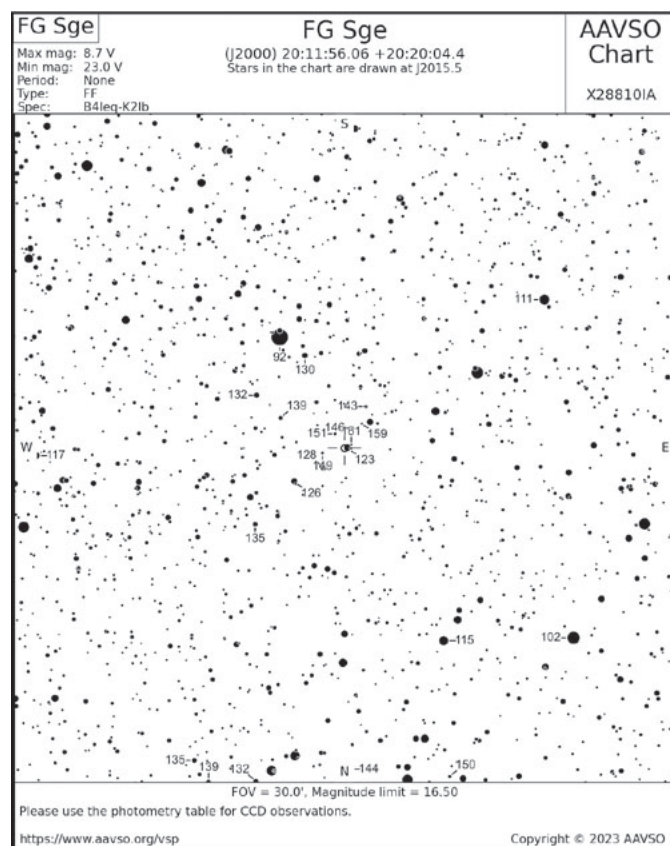
How did FG Sge get this way, where it moved through at least three spectral classes in eighty years? It appears that, before the time of its discovery, FG Sge had already left the Main Sequence of stars and had gone through the process of becoming a planetary nebula; shedding its outer atmosphere into the proto-planetary shell that now surrounds it, the star shrank and became hotter. It then underwent a helium flash — the ignition of a thin layer of helium deep inside the star's interior, which made the star become brighter and larger, which *then* caused it to become redder and cooler. Got all that?

By 1992, FG Sge had cooled to a G-type Sun-like star, but began to experience extreme and irregular variability. It became an eruptive variable of the R Coronae Borealis type, falling below magnitude 16 for long stretches and then shooting back up to magnitude 10 or brighter. Currently, FG Sge is an orange star of spectral type K, with variations that may bring it back into type G. (Note that this a very superficial description of FG Sagittae's history and behavior; a more-detailed account would take an entire article.)

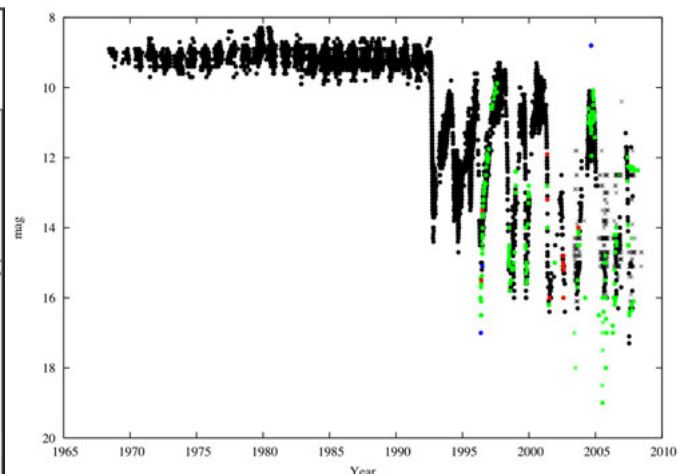


Finder chart for U Sge. Note that the directions are reversed N-S and E-W. The brightest star in the field is 8.2-magnitude HD 181361; the bright star closest to U Sge is 11th magnitude. Field is 30' per side. Courtesy AAVSO.org.

Although its minimum falls below the magnitude limit for an 8-inch telescope, such a scope is fine for observing FG Sge over much of its variation. To find the star, draw a line from Gamma Sge to Eta Sge, and then extend that line by the same distance (i.e. FG is as far from Eta Sge as Eta is from Gamma Sge). The chart below will help narrow down its location. Note that the star marked “123” (so magnitude 12.3) is just west of FG; take care not to assume that the 12.3-magnitude star is FG. Use the other stars on the chart to estimate FG’s brightness as the summer nights pass; you may see it on the way up or down its variability cycle. For reference for those with GoTo scopes, the star marked “92” (magnitude 9.2, of course) is HD 351568.



Finder chart for FG Sge. Note that the directions are reversed N-S and E-W. Field is 30' per side. Courtesy AAVSO.org.



Light curve for FG Sge. Courtesy AAVSO.org.

As we move on to targets for larger telescopes, we leave the stellar objects behind. Sagitta has emission and planetary nebulae in abundance, and our objects for 10- and 12-inch telescopes are little-known examples of these classes. **Sharpless 2-82**, our quarry for 10-inch telescopes, consists of a pair of small nebulae oriented N-S to each other. The southern segment, surrounding a 10.7-magnitude star, is about 5' in diameter; the northern part of the nebula is half the size of the southern. A UHC filter is greatly useful on objects like Sh 2-82, suppressing the bright Milky Way background and letting the nebula’s hydrogen gas appear just slightly brighter. The southern component is supposedly visible without a filter altogether, but perhaps only in somewhat-larger apertures.

Sh 2-82 isn’t the easiest object to locate. It lies 2.3 degrees west-northwest of Alpha Sge, or just under two degrees south-southeast of 4 Vulpeculae, the southern-most star in the “hook” of the Coathanger Cluster. A 7.5-magnitude star lies 7.5 arcminutes east of the nebula’s southern lobe; this star has a 10.8-magnitude star 1.25 arcminutes to its southeast.

Our final target for this month — although we’ve barely scratched the surface of Sagitta — wasn’t even discovered until 2005. **The Necklace Nebula** (PN G054.2-03.4) is a tiny beetle-shaped planetary nebula whose name comes from an inner ring of bright, outward-flaring jets. These jets largely won’t be visible optically (the nebula itself is enough of a challenge), but they’re one of the most-noteworthy features of the nebula in photographs. As it is, it’ll probably take at least a 12-inch telescope to dredge up the nebula from the starry depths around it.

The Necklace Nebula is a mere 0.3' x 0.2' in size, and its faintness (along with the crowded field it inhabits) is what led to its remaining undiscovered for so long. Yet the nebula is somewhat more visible visually than one might expect from photographs. The majority of amateur observations of the Necklace Nebula are noted at <https://www.deepskyforum.com/showthread.php?1380-Necklace-Nebula&p=7779&viewfull=1#post7779>

Use Beta Sge as your leaping-off point for The Necklace Nebula; the thread linked above has a couple of (admittedly rough) finder charts for the nebula from there.

Thanks to its location among the starry galactic plane, Sagitta has an embarrassment of deep-sky riches for a constellation so small. A stargazer armed with an 8-inch telescope could spend an entire summer within the constellation's borders without catching every object visible there. So the next time you're done with Albireo and the Veil Nebula and the Dumbbell Nebula, spend a little time among the stars of the Arrow; you may be surprised at what you can find.

Gallery

August provided many great opportunities for astrophotography, starting with the first of two full “supermoons” on August first and finishing with the second “super blue moon” on August 31st. Inbetween, club members took some awesome shots of just about everything else. Zoom in a bit on the ones reproduced here; they'll still be pixel-sharp at 200%.



The August 1st Supermoon rising over Lookout Point Reservoir. Photo © by Dave Horton.



The North America Nebula. Photo © by Wesley Magyar.



August 1st Supermoon. Photo © by Alan Gillespie.



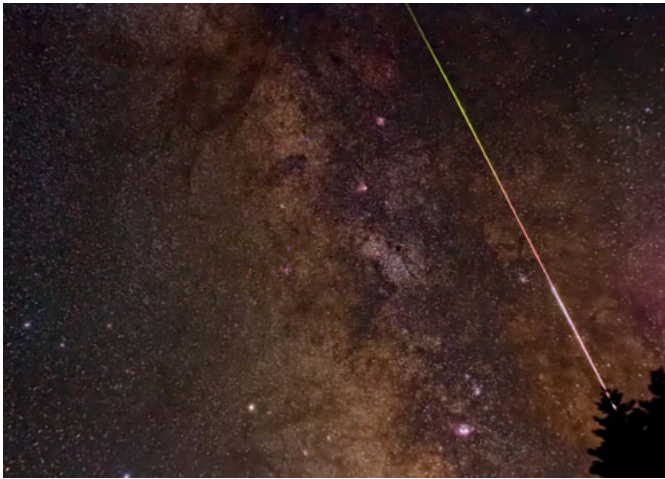
Venus near solar conjunction. Photo © by Jerry Olton.



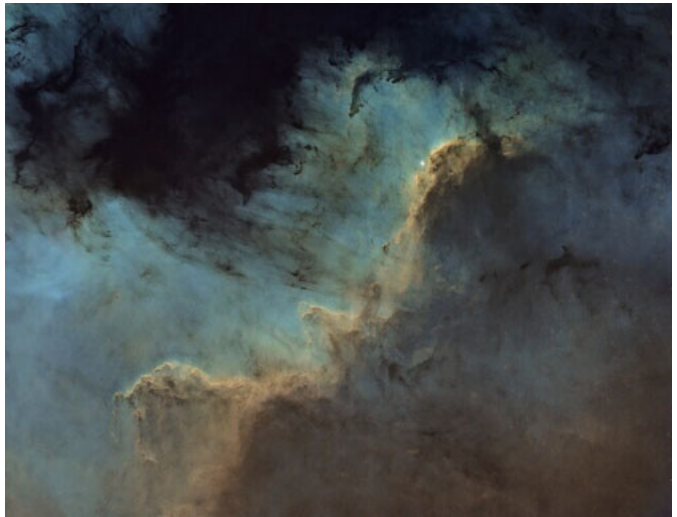
M31, the Andromeda Galaxy. Photo © by Ellen Poulsen.



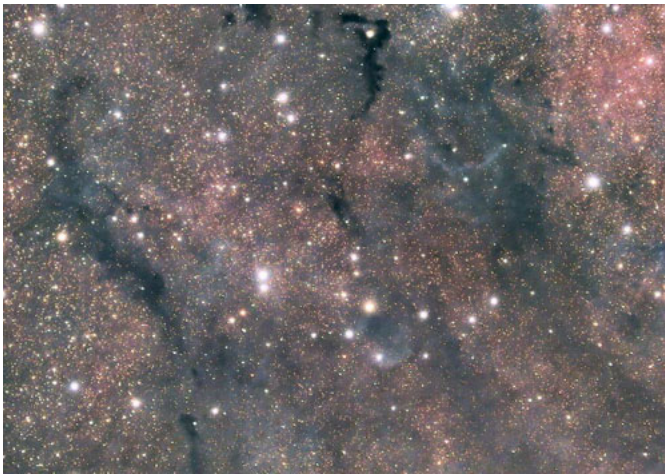
The Milky Way from the Oregon Star Party.
Photo © by Mark Wetzel.



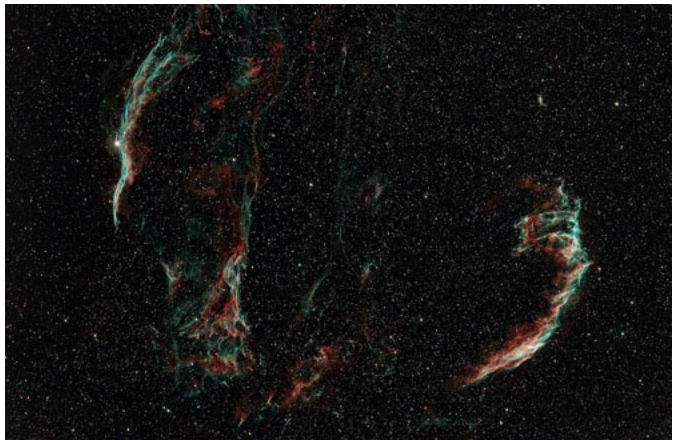
A Perseid Meteor. Photo © by Alan Gillespie.



The Cygnus Wall, a portion of the North America Nebula.
Photo © by Ronald Perez



LDN 998 and companions. Photo © by James Pelley.



The Cygnus Loop. Photo by Wesley Magyar.



NGC 891, the "Twilight Zone Galaxy." Photo © by Mike MdAdams.



Jeff Phillips's talk at our August 17th meeting inspired new member Enzo Carlos to try his hand at planetary imaging. Above are his first attempts at Jupiter and Saturn. Below are his next pair. At this rate, he'll be rivaling Jeff by year's end. Go Enzo!
Photos © by Enzo Carlos.





M27, the Dumbbell Nebula. Photo © by Mike McAdams.



August 31st Supermoon. Photo © by Enzo Carlos.



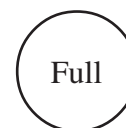
August 31st Supermoon. Photo © by Alan Gillespie.



August 31 Supermoon rising above Fern Ridge Reservoir. Photos © by Dave Horton.



Observing in September 2023

Sep 6, 3:21 PM	Sep 14, 6:40 PM	Sep 22, 12:32 PM	Sep 29, 2:58 AM
Mercury lost in Sun	Mercury Rise: 5:45 AM	Mercury Rise: 5:26 AM	Mercury Rise: 5:45 AM
Venus Rise: 4:17 AM	Venus Rise: 3:52 AM	Venus Rise: 3:36 AM	Venus Rise: 3:29 AM
Mars Set: 8:29 PM	Mars Set: 8:09 PM	Mars Set: 7:48 PM	Mars Set: 7:31 PM
Jupiter Rise: 9:58 PM	Jupiter Rise: 9:26 PM	Jupiter Rise: 8:54 PM	Jupiter Rise: 8:25 PM
Saturn Set: 5:49 AM	Saturn Set: 5:15 AM	Saturn Set: 4:41 AM	Saturn Set: 4:11 AM
Uranus Rise: 10:13 PM	Uranus Rise: 9:42 PM	Uranus Rise: 9:10 PM	Uranus Rise: 8:42 PM
Neptune Rise: 8:05 PM	Neptune Rise: 7:33 PM	Neptune Set: 6:49 AM	Neptune Set: 6:20 AM
Pluto Set: 2:41 AM	Pluto Set: 2:09 AM	Pluto Set: 1:37 AM	Pluto Set: 1:09 AM

All times Pacific Daylight Time (March 12 – Nov 4, 2023 = UT -7 hours) or Pacific Standard Time (November 5, 2023 – March 9, 2024 = UT -8 hours)

Date	Moon Rise	Moon Set	Twilight Begin	Sun Rise	Sun Set	Twilight End
9/1/2023	20:56	08:32	04:52	06:36	19:48	21:31
9/2/2023	21:18	09:51	04:54	06:37	19:47	21:29
9/3/2023	21:41	11:09	04:55	06:38	19:45	21:27
9/4/2023	22:08	12:26	04:57	06:39	19:43	21:25
9/5/2023	22:39	13:40	04:58	06:40	19:41	21:23
9/6/2023	23:18	14:50	05:00	06:41	19:39	21:21
9/7/2023		15:54	05:01	06:42	19:38	21:18
9/8/2023	00:05	16:48	05:03	06:44	19:36	21:16
9/9/2023	01:00	17:32	05:04	06:45	19:34	21:14
9/10/2023	02:01	18:07	05:05	06:46	19:32	21:12
9/11/2023	03:06	18:35	05:07	06:47	19:30	21:10
9/12/2023	04:11	18:58	05:08	06:48	19:28	21:08
9/13/2023	05:15	19:17	05:10	06:49	19:27	21:06
9/14/2023	06:19	19:35	05:11	06:50	19:25	21:04
9/15/2023	07:22	19:52	05:13	06:51	19:23	21:01
9/16/2023	08:26	20:09	05:14	06:53	19:21	20:59
9/17/2023	09:31	20:27	05:15	06:54	19:19	20:57
9/18/2023	10:38	20:48	05:17	06:55	19:17	20:55
9/19/2023	11:47	21:14	05:18	06:56	19:15	20:53
9/20/2023	12:59	21:46	05:19	06:57	19:14	20:51
9/21/2023	14:11	22:29	05:21	06:58	19:12	20:49
9/22/2023	15:18	23:25	05:22	07:00	19:10	20:47
9/23/2023	16:15		05:23	07:01	19:08	20:45
9/24/2023	17:02	00:34	05:25	07:02	19:06	20:43
9/25/2023	17:39	01:52	05:26	07:03	19:04	20:41
9/26/2023	18:09	03:15	05:27	07:04	19:03	20:39
9/27/2023	18:34	04:39	05:29	07:05	19:01	20:37
9/28/2023	18:56	06:01	05:30	07:06	18:59	20:35
9/29/2023	19:18	07:22	05:31	07:08	18:57	20:33
9/30/2023	19:40	08:41	05:32	07:09	18:55	20:31

All times are for Eugene, Oregon Latitude 44° 3' Longitude 123° 06'

Items of Interest This Month

Comet 103P/Hartley cruises through Perseus and Auriga this month.

9/3 Io shadow transit 10:16 PM – 00:26 AM.

9/6 Ganymede shadow transit 10:48 PM – 00:39 AM. Mercury in inferior conjunction (between us and the Sun).

9/7 Europa shadow transit 9:29 – 11:50 PM. Europa begins transit 11:57 PM.

9/8 Callisto crosses below Jupiter's S. pole. Nearest approach ~10:20 – 10:30 PM.

9/13 Tethys and its shadow transit Saturn 7:45 – 9:19 PM (Tethys) and 7:45 – 9:41 PM (shadow).

9/19 Io shadow transit 8:33 – 10:43 PM.

Neptune at opposition. Venus at greatest brilliance.

9/22 First Quarter Friday star party.

Mercury at greatest western elongation (visible in morning). Autumnal equinox 11:50 PM.

9/25 Io, Europa, and Callisto align on a diagonal as midnight approaches.

9/26 Io shadow transit 10:27 PM – 00:37 AM.

9/27 Nearly full Moon occults Psi¹ and Psi² Aquarii 7:05 PM and 7:37 PM (low in the east). Reappearance at 7:41 and 8:36 PM.