SkyWAAtch

The Newsletter of Westchester Amateur Astronomers

July-August 2025

The Center of the Milky Way from Cherry Springs by David Parmet

David made this image with a 24-mm lens at f/5.6 on a Nikon D810 DSLR, mounted on a fixed tripod. He used Starry Landscape Stacker, a program for MacOS, to stack 36 exposures, each 20 seconds, at ISO 1600.

The bright knot of stars in the center just above the trees is Messier 7, also known as Ptolemy's Cluster. The Alexandrian astronomer described it as a nebula in 130 A.D. The bright star on the right is Antares. The center of the Milky Way is approximately at the center of this image.

Our club meetings are held at the David Pecker Conference Room, Willcox Hall, Pace University, Pleasantville, NY, or on-line via Zoom (the link is on our web site, www.westchesterastronomers.org).

WAA September Meeting

Friday, September 12 at 7:30 pm

Members' Night

WAA members

Club members present brief talks on their equipment, techniques, travel, or any other subject of general astronomy interest. A unique WAA tradition!

Please contact Pat Mahon (waa-programs@westchesterastronomers.org) if you would like to make a presentation.

Call: **1-877-456-5778** (toll free) for announcements, weather cancellations, or questions. Also, don't forget to visit the WAA website.

WAA Members: Contribute to the Newsletter!
Send articles, photos, or observations to waa-newsletter@westchesterastronomers.org

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Editorial Consultant: Scott Levine
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Proofreader: Eric Baumgartner

Also In This Issue

SkyWAAtch is written by human beings.

WAA October Meeting

Friday, October 10 at 7:30 pm

The Sloan Digital Sky Survey

Michael Blanton, PhD

Professor of Physics, New York University
Director, Sloan Digital Sky Survey IV

Starway to Heaven

Ward Pound Ridge Reservation, Cross River, NY

Date	Sunset	Moon Phase	Moon Set/Rise
7/19	8:25 pm	0.27	Rises 1:07 a.m.
7/26	8:19 pm	0.06	Sets 9:38 p.m.
8/16	7:52 pm	0.41	Rises 11:48 p.m.
8/23	7:41 pm	0.01	New
8/30	7:30 pm	0.48	Sets 10:50 p.m.

New Members

Farid El Nasire	Mamaroneck
Nathan Hartshorne	Larchmont
Bilun Karal	Scarsdale
David Martin	Stamford
Steven Shepard	Larchmont

Renewing Members

Leandro Bento	Mohegan Lake
Laura Brengelman	Greenwich
David Butler	Mohegan Lake
Peter Castleton & Melinda Battle	Pound Ridge
Marcy Cohen	Croton on Hudson
Joyce Dow	White Plains
Eileen Fanfarillo	Irvington
Ireneo Fante	Brookfield
Jimmy Gondek & Jennifer Jukich	Jefferson Valley
Joan Indusi	Ossining
Sabina Kaplan	Larchmont
Wendy Kutin	Mt. Kisco
Glen & Patricia Lalli	White Plains
Patricia Mahon	Yonkers
Mark Maiello	Ossining
Mark Mayo	White Plains
Arthur Miller	New Rochelle
Alexander Mold	Salem

ALMANAC for July & August 2025

Bob Kelly, WAA VP of Field Events


Bob Kelly


1Q July 2


Full July 10


3Q July 17


New July 24


1Q Aug 1


Full Aug 9


3Q Aug 16


New Aug 23

It's Summertime!

But for us astronomers, the shadow is getting longer when we are out with our solar telescopes, so we know the days are getting shorter, and, thus, the nights are a bit longer and darker. Some parts of the world don't even have nighttime astronomy this time of year, when twilight goes all night long. In mid-July, London and the northern two-thirds of Canada have twilight all night (and further north daytime all night!), but we have the prospect of darker skies and longer nights in August as we approach the September equinox.

Where Are the Planets?

Most of the planets are in the morning sky, but Mercury and Mars are visible after sunset in early July. Saturn is on its way to the pre-midnight sky, rising about midnight in mid-July, and by 8:30 p.m. EDT on Labor Day, just as Mars is leaving the evening sky.

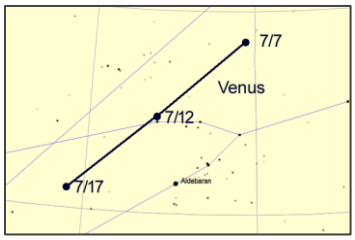
It Must Be Spring Somewhere

We started our last WAA meeting of the spring with "Fly Me to the Moon" by Frank Sinatra and the Count Basie Orchestra. "Let me see what spring is like on Jupiter and Mars" sang Ol' Blue Eyes. But Jupiter's axis is only tilted three degrees from north, so there's no spring there. Mars, on the other hand, has a 25-degree inclination, and it is in the middle of its northern hemisphere spring during our summer. Good luck seeing the shrinking northern polar cap through the telescope as Mars' apparent size decreases from 5 to 4 arc seconds this month. It's dimming, too, going through magnitude +1½, which would have it falling out of the list of the top 25 brightest stars.

THE Morning Star

Venus is blazing in the pre-dawn sky, but actually fades from magnitude -4.2 to -3.9, as it fails to keep up with Earth on its trip around the Sun. The "morning star" heralded in literature and culture shrinks from 18 arc seconds wide to 13 over the summer. With an increasingly gibbous phase, it's not very exciting in a telescope, but it's still dazzlingly bright enough that a filter will help viewing the phase.

On July 12th, Venus makes its contribution to the "V" of the Bull's head in Taurus, across from Aldebaran, neither being a member of the Hyades star cluster. Follow Venus as it slides through the horns of the Bull, arriving at the tip of the lower horn in late July.



Boys Hanging Out

Jupiter spends the summer hangin' with Gemini. They rise together in the second half of July, getting out the Sun's glare. The twins are laying on their sides at dawn, as if they are using our horizon as a beach blanket.

Mercury Plays Both Sides

Mercury ends its evening sky residency at the start of July. It was as hard to see as those summer concert tickets you wanted and couldn't get. It passes invisibly in the foreground of the solar scene at inferior conjunction on July 30, 5 degrees below the ecliptic.

The innermost planet moves into the morning sky in the second half of August. Mercury reaches greatest elongation on the 19th. It gets brighter, but smaller, passing into negative magnitude territory. Superior conjunction occurs in mid-September.

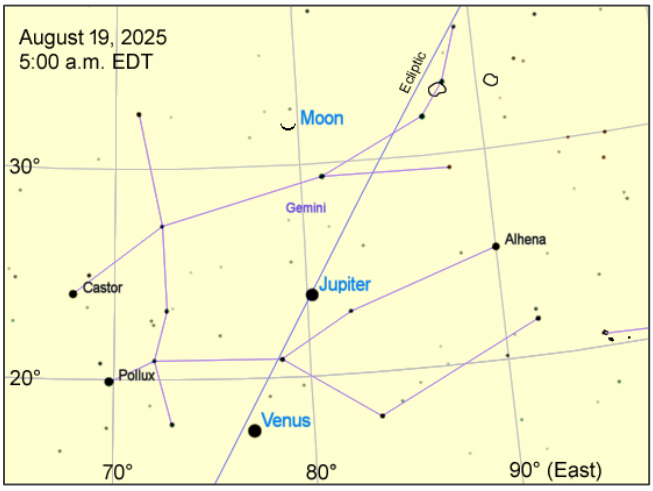
Occultations by the Moon

Our Moon appears to gobble up the Pleiades star cluster early on the morning of July 20th. Dawn will be breaking as the Moon slides into the cluster, so it will be hard to see without optical aid.

Another interesting occultation by the Moon occurs just before 1 a.m. on July 7th. The Moon covers +2.9 magnitude π (Pi) Scorpii (Π Sco), the lower of the three stars forming the Scorpion's head, 7° due west of the "Rival of Mars" star Antares in the Scorpion's heart. Π Sco has the peculiar name "Fang," derived from the Chinese 房宿 (*Fáng Xiù*), meaning "Room," for the asterism consisting of Pi, Rho, and Delta Scorpii. The IAU Working Group on Star Names assigned the name Fang to Π Sco in 2017.

Brightest Planets Join Up in August

Jupiter moves away from the Sun in the morning sky. Venus catches up in the second week of August. On August 12th, the King of the Planets is just 50 arcminutes from Venus, making a great pair of bright planets. The Moon joins them on the 19th and 20th. We wonder what the "celestial smile" people will make of that lineup?



Where's Neptune and Uranus?

In the morning sky, use Saturn to find your way to Neptune, as they are near each other all summer, closest on July 6th, at two moon-widths apart. By the end of August they are still less than 2° apart.

Uranus is riding high as Taurus soars into the morning sky. It hangs several degrees south of the Pleiades this summer.

Just for the record, Pluto reaches opposition from the Sun on July 25th, at magnitude +14.4. The Moon serves as a blindingly bright pointer to Pluto's whereabouts on August 8th, in Capricorn.

Do You Like Meteor Showers?

The famous Perseids are good on many nights around their peak night of August 12-13, but the waning gibbous Moon hanging in the post-midnight sky makes seeing them harder than usual.

The Alpha Capricornids and Southern Delta Aquariids peak before dawn on July 29th and 30th. Not very strong showers for our latitude, but skies are dark with only a crescent Moon shining in the evening.

Viewing Space Stations

The International Space Station is visible in the morning half of the night, starting in July. Around July 11th, there are passes all night long, followed by evening passes through the end of July. Maybe just morning passes for the last half of August.

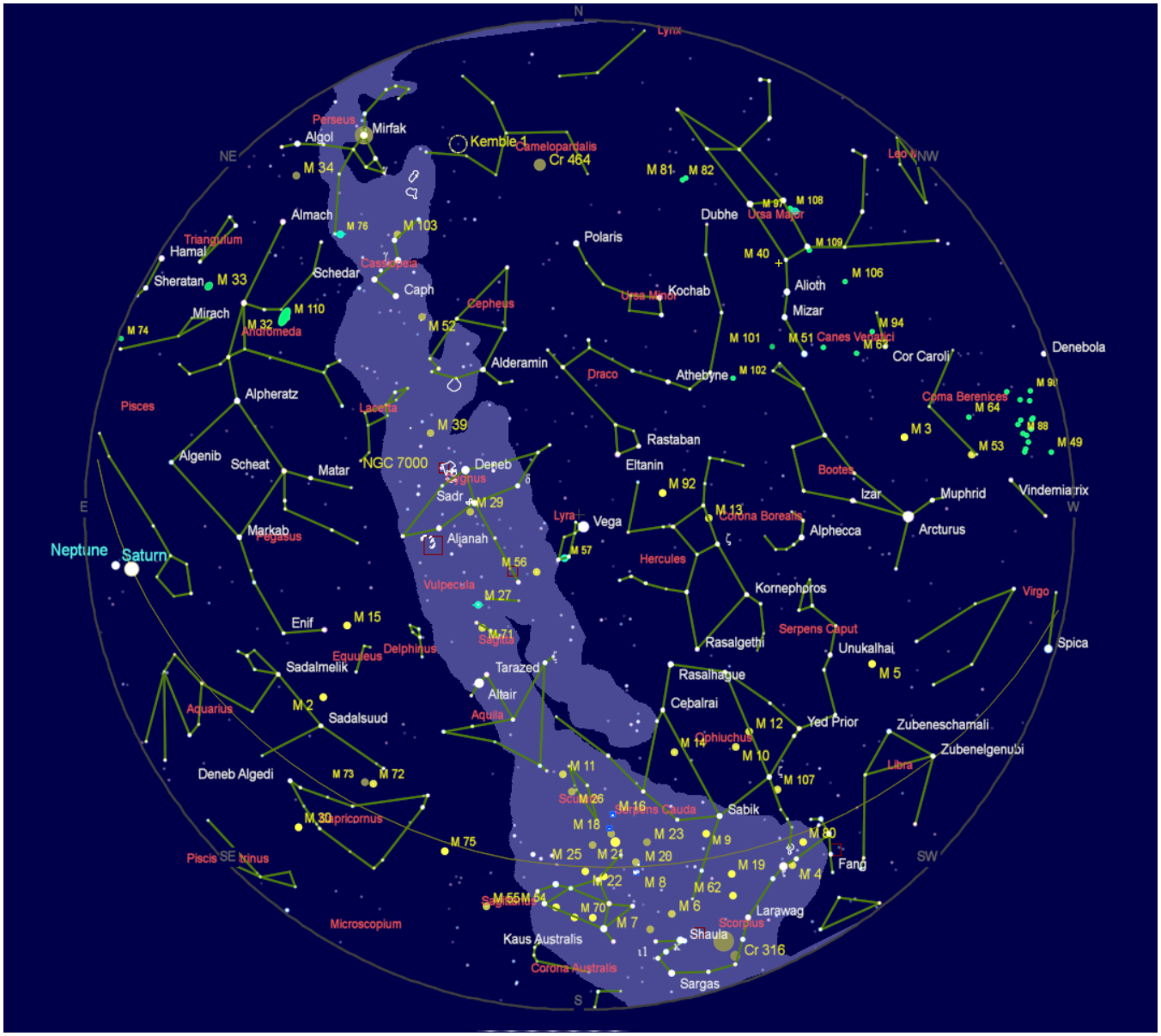
Tiangong, China's space station, makes overflights in the mornings in the first half of July, and the evenings in the second half of July. It is predicted to have passes in August only in the morning and only in the second half of August, just like the ISS. Check your favorite satellite visibility app or https://www.heavens-above.com/ for updates.

Starry Skies

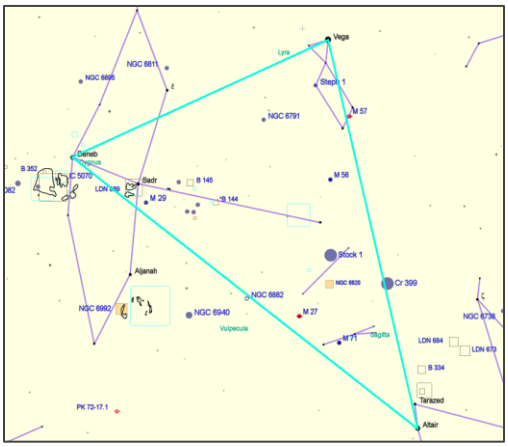
When it does get dark, this is the time of year for Sagittarius and Scorpius. They anchor the Milky Way low in our southern skies. If you can get a clear view to Lupus, to the lower right of our summer pair, there is a new star, V462 Lupi, which as of press time had reached 5th magnitude (see page 25). At our latitude, it may be hard to spot without optical aid. This is a great time to turn those binoculars you've been using at the beach to watch for ships, sea life, and beach bodies to astronomical use. The finder chart is at https://is.gd/V462LupiChart.

Moving up from the southern part of the ecliptic, the band of the Milky Way leads us up past the Eagle (Aquila) and though the Swan (Cygnus), sometimes called the Northern Cross, flying south. I know I'm having a good night when I can pick out the Arrow (Sagitta) and the small but cute Dolphin (Delphinus) between the Swan and the Eagle. Vega, overhead in Lyra, was the second star we saw in the twilight at the June star party, after Arcturus in Boötes. Then, we used it to arc back to the Big Dipper, standing on its bowl, with the handle pointing upward.

Sky Map for July 2025



Midnight July 15, 2025. The sky will have a similar appearance around 11 p.m. on July 1 and 1 a.m. on July 31.

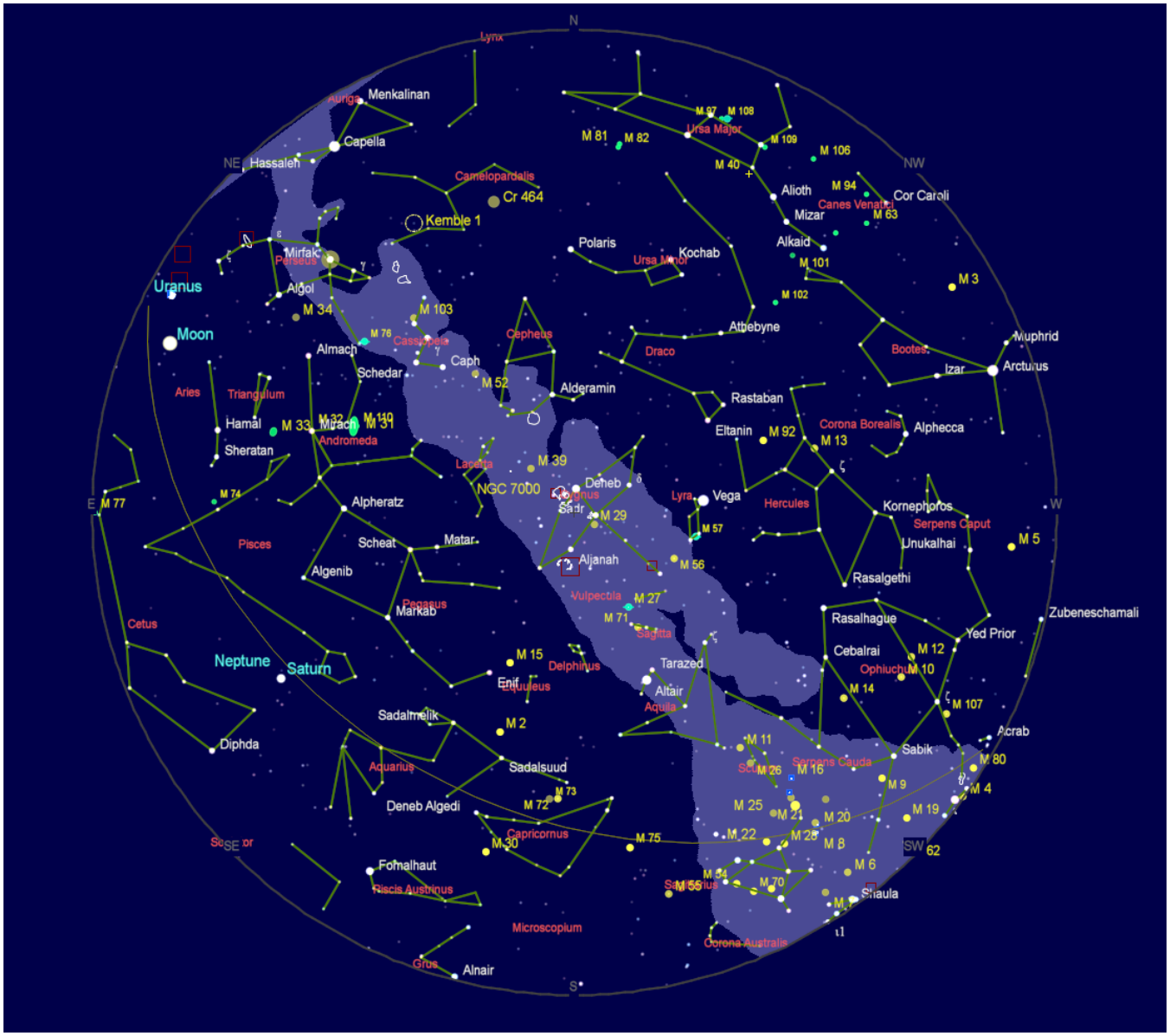


A Few Summar Triangle DSO Highlights for Small Scopes

Type	Object	Constellation	Mag	Size
PN	M57 (Ring)	Lyra	9.4	1’
PN	M27 (Dumbbell)	Vulpecula	7.3	8’x6’
OC	CR 399 (Coathanger)	Vulpecula	3.6	60’
OC	NGC 6940	Vulpecula	6.3	31’
OC	M29	Cygnus	6.6	7’
OC	NGC 6871	Cygnus	5.2	20’
GC	M56	Lyra	8.3	5’
GC	M71	Sagitta	8.3	6.1’

PN:Planetary nebula, OC: Open cluster, GC: Globular cluster

Sky Map for August 2025



Midnight August 15, 2025. The sky will have a similar appearance (except for the Moon) around 11 p.m. on August 1 and 1 a.m. on August 31.

Join the WAA Discord Server

Discord is an app (iOS, Android, Windows) that will vastly enhance communication within the club and increase the value of your membership. It's free.

Join the "Office Hours" Discord chat hosted by WAA President Jordan Webber every other Wednesday at 7:00 p.m. For more information and to join, go to https://is.gd/WAADisc.

Annual WAA Member Picnic

Saturday, July 19, 2025, from 12 p.m.–4 p.m.

Croton Point Park, Pavilion 1

RSVP by Monday, July 14 to:

Eva Andersen: andefam55@gmail.com or text 845-803-4949

Please include number attending and any food allergies

Make your plans now to join us for the annual WAA Member Picnic at beautiful Croton Point Park. Spend a relaxing and fun afternoon catching up with old friends and making new acquaintances. *A benefit of your membership is our annual complimentary member picnic.* Our memberships are considered family memberships so feel free to bring family members or a guest.

The club will provide hot dogs, hamburgers, chicken, veggie dogs & veggie burgers, salads, chips and non-alcoholic drinks. We supply condiments, plates, cups, utensils, napkins and official WAA club cookies. **Bring your own beer and wine**. **Hard liquor is not permitted on Park grounds**. We will provide coolers and ice for your beverages. Feel free to bring a side dish or dessert to share.

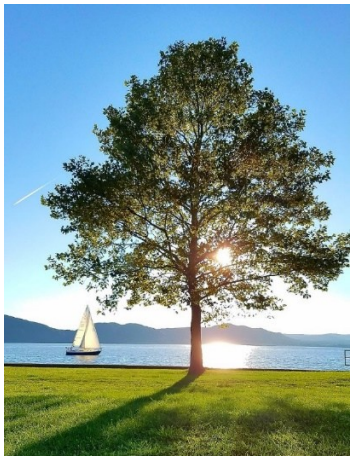
Meet us in Pavilion 1, located at **1A Croton Point Avenue, Croton on Hudson, NY 10520**. The pavilion has capacity for 200 people and includes picnic tables and cooking grills. **This is a rain or shine event.**

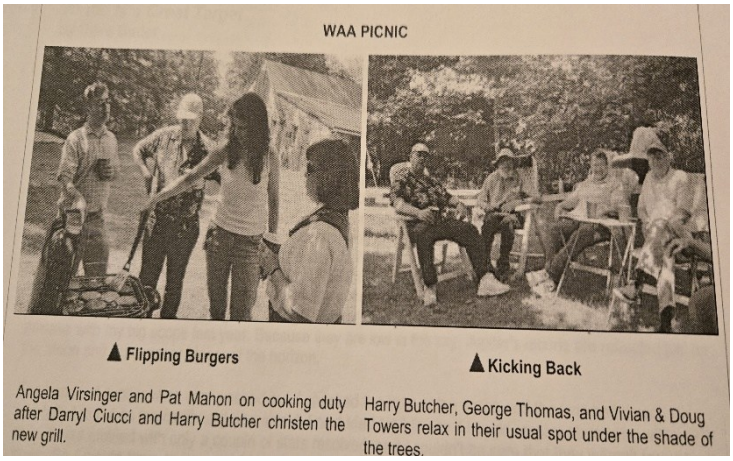
Croton Point Park is a lovely 508-acre Westchester County Park located on the largest peninsula on the Hudson River. This Park is well known to **bird watchers,** so bring your binoculars! There are several **hiking** trails in the park. **Dogs** are permitted but must be leashed at all times.

For more information: **https://parks.westchestergov.com/croton-point-park**

There is no cost for the picnic and no admission fee to enter Croton Point Park but there is a **parking fee:** $5 per car for Westchester Park Pass holders, $10 per car without Park Pass.

The annual Trivia contest will be held at 2 p.m.!





Another Movie Telescope: *Borderlands*

What's a very efficient way to lose $80 million? Make this movie, a 2024 box-office bomb that cost $120 million and died in the theaters. Like you, we had never heard of it, but one evening while channel surfing, Cate Blanchette appeared, sporting red hair. Intrigued, we watched. Borderlands is based on a video game and much of the time has the frenetic pace of one. Blanchette plays a tough interplanetary bounty hunter on what seems to be an impossible quest, first rescuing a kidnapped child and then seeking a mystical artifact with magical powers. The arena, as is usual for these things, is a dystopian world, meaning the heroes (misfits, of course) must battle hordes of bloodthirsty mutants, making impossible escapes while never running out of bullets or getting hit by any. An evil mastermind gets his just deserts, as always. Many scenes look as if the cast has been completely replaced by their video game avatars (and they probably were). There's some humor, supplied by an over-the-top Kevin Hart, a little girl who hides bombs in teddy bears, and a neurotic R2D2-clone mounted on a unicycle and very annoyingly voiced by Jack Black. Even grande dame Jamie Lee Curtis can't rescue this mess.

A telescope appears in one scene, and then in the final tableau. It looks like a 4-inch scope (on a go-to mount) onto which is added an extension to make it longer, perhaps for clever Freudian reasons, since video games are generally intended for pubescent boys. The scope bears no relationship to the plot. Also, don't ask why the little blonde girl is wearing a headband with huge floppy rabbit ears on the front. They never tell you. ■

Deep Sky Object of the Month: Messier 29

We have just one new DSO for July-August 2025, an object that will be well overhead for the entire summer, along with its many wonderful companions in the Summer Triangle. It's the open cluster Messier 29, whose 80 or so stars combine to a magnitude of around 7 within an area of 7 arcminutes. It's smack-dab in the middle of the Milky Way in Cygnus and so at first it might not be quite so easy to spot among the galaxy's "congeries of stars," as Galileo put it.

There is a substantial amount of interstellar dust between us and the cluster. Its brightness would appear three magntidues greater were it not for this intervening star-stuff. The region around Gamma Lyrae (Sadr), just 2° away, hosts many diffuse nebulae, including the Crescent Nebula (NGC 6888) and IC 1318.

What's another blob of stars to us? Why should it be interesting? Stephen James O'Meara (in *Deep Sky Compoanions: The Messier Objects*) tells us that,

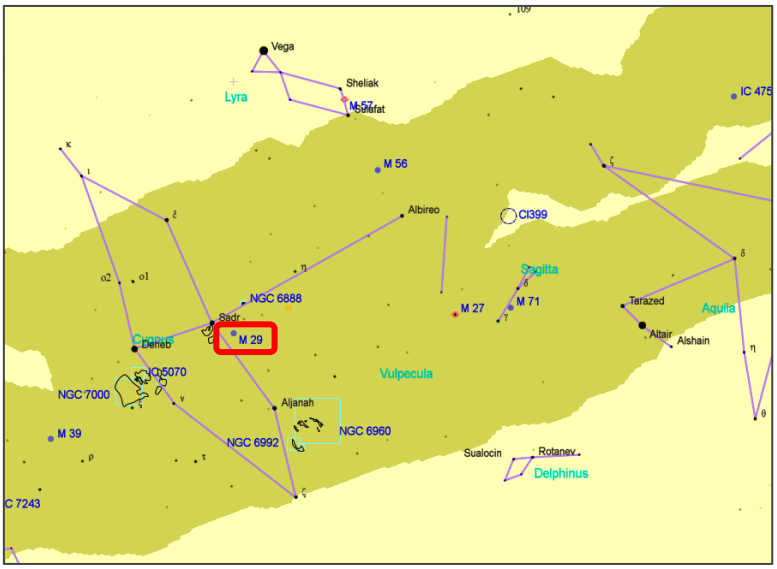
> When I used 103x [in a 4-inch refractor] and let my imagination fly, I saw a stream of 13th magnitude stars coursing through the banks of brighter stars…. Then something intersting happened. As my eye followed that elegant river, my mind drifted to a time when I stood waist high in sawgrass in the Florida Everglades. There my surroundings looked rather bleak, until I caught sight of a single orange wildflower. That tiny splash of color transfomed a dull landscape into a grand sensation. Likewise, the delicate stream of stars in M29 turns an otherwise unremakrable cluster into a memorable one.
>
> Now my eyes played connect the dots, and I saw an entire scene—an aerial view of the glades. I noticed a bright wedge of Milky Way west of M29 and envisioned a flock of flamingos; and two stars to the east of M29 were crocodiles in the salty Atlantic. All this is highly imaginative, but such imagery helps me to unite the wonders I see in the sky with those I've experienced on earth. Such fancy is the very foundation of celestial mythology. Why not create your own mythology with the star patterns in open clusters?

It is the essence of visual observing not just to look, but to look and imagine. Like O'Meara, take your time at the eyepiece!

Visit M29 while you are observing the many glories of the Summer Triangle this July and August. ■

Messier 29	
Constellation	Cygnus
Object type	Open Cluster
Right Ascension J2000	20h 23m 56s
Declination J2000	+38° 31' 24"
Magnitude	7.0
Size	7 arcminutes
Distance	4,400 light years
NGC designation	6913
Discovery	Charles Messier, 1764

Visibility for M29			
2300 EDT	7/1/25	7/21/25	8/15/25
Altitude	48° 45'	63° 20'	81° 51'
Azimuth	74° 45'	83° 34'	103° 37'

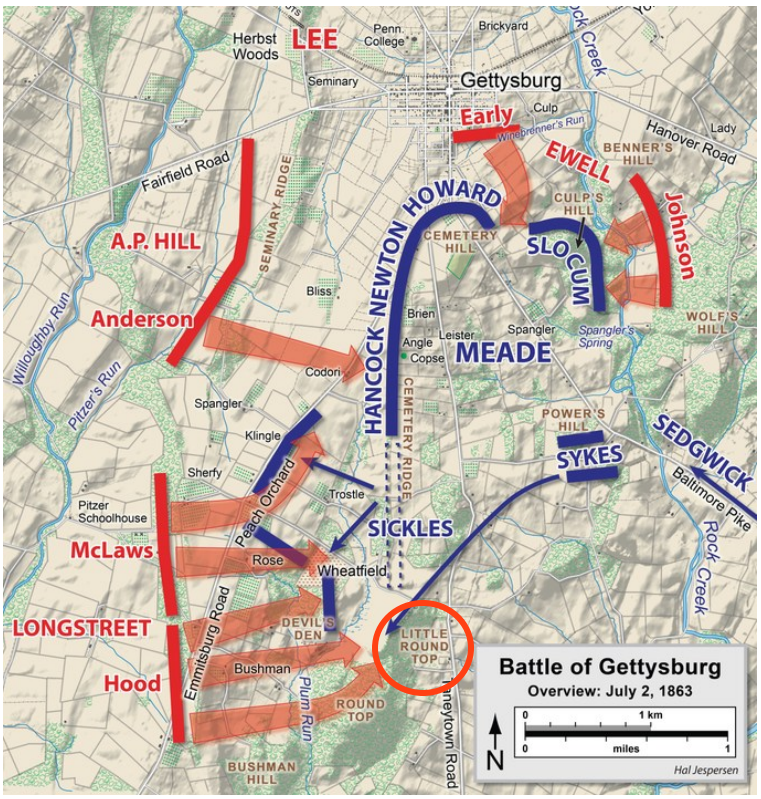


The Astronomer at the Museum: A Civil War Telescope

This spotting scope and tripod was probably used at the Battle of Gettysburg on July 1-3, 1863, by Union General Governeur K. Warren. On the second day of the three-day battle, on his own initiative Gen. Daniel Sickles moved the III Corps, on the left flank of the Union line, 300 yards to the west, engaging several Confederate corps. This left Little Round Top, a hill 150 feet above the plain at the southern end of the Union line, undefended. Ordered by Union commander Maj. Gen. George Meade to reconnoiter, Warren realized that the Confederates were planning to occupy the hill, which would give them the high ground above and behind Sickles's troops. He sent for help, which was provided by the Union V Corps under Gen. George Sykes. The reinforcements arrived just a few minutes before the Confederates, and although outnumbered almost two to one, Sykes had the more advantageous position, repelled the attack, and occupied the hill.

The telescope is in the museum at the Gettysburg National Military Park in Pennsylvania. Although no information is given regarding its optics, the instrument undoubtedly has a concave eye lens, to provide an upright image at the expense of a narrow field of view. This is similar in design to Galileo's telescope. The small knob near the eyepiece suggests that it may have had some form of mechanical focuser, rather than relying on the user manually extending the tube to achieve focus.

We visited the battlefield in early June 2025. It is about four hours (without traffic) from Westchester by car. The large, well-curated museum provides a wealth of information. An introductory film describes the strategic and tactical aspects of the battle, and effectively provides a sense of the carnage, desperation, and heroism that took place during those three critical days. Walking among the many memorials and cannons on the battlefield is humbling. ■



First Images from Vera Rubin Observatory — Larry Faltz

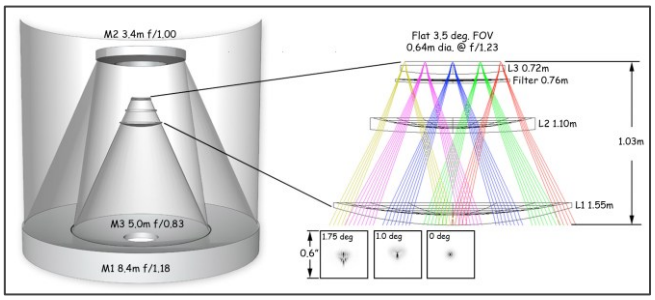
By now you have seen the amazing first images from the Vera Rubin Observatory, and they are phenomenal. The 8.4-meter Simonyi Survey Telescope (LSST), has a unique bi-figured primary mirror, the world's largest CCD camera (3,200 megapixels) and the ability to slew its 386 tons 3.5 degrees in 4 seconds. Originally named the Large Synoptic Survey Telescope, an act of Congress in 2019 renamed the observatory for Vera Rubin. She demonstrated the presence of dark matter in spiral galaxies by measuring their rotation rates. The observatory has been in development for almost thirty years. Construction begin in 2015.

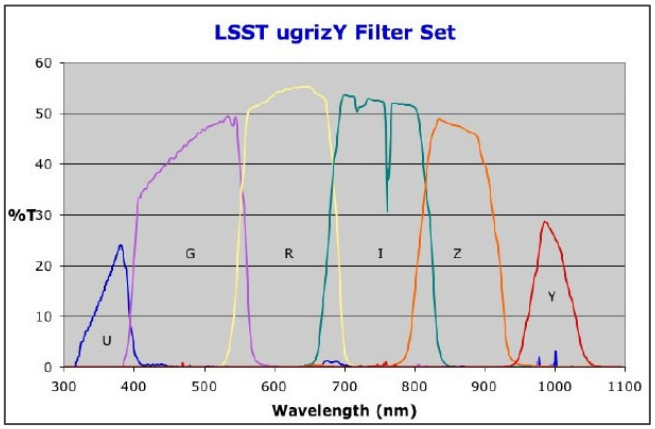
The main observing program is the ten-year "Legacy Survey of Space and Time," which fortunately abbreviates to LSST, so all of the people who called it "LSST" for years and had trouble switching to "Vera Rubin" can continue to say "LSST," at least when they are referring to the observatory's scientific mission. The entire southern hemisphere sky will be imaged every 3 days, generating 20 terabytes of data each night. Each 30-second exposure will be compared to prior images of the same field to identify supernovas, asteroids (2104 new ones were found in seven nights of observations this spring), variable stars, the interiors of active galactic nuclei, and other transient phenomena. The telescope will provide data about gravitational lensing and microlensing.

After initial processing at the telescope, the data will be sent to SLAC (the SLAC National Accelerator Laboratory, which evolved from the Stanford Linear Collider facility in California) where small segments of the image will be compared with prior data. If something has changed, alerts will be generated, possibly as many as ten million a night before filtering. Then the data will be passed to nine "data brokers," organizations with automated software programs to identify items of interest and feed information to astronomers with specific research programs.

The main mirror is unique. It has two figures. The f/1.8 primary (M1) mirror occupies the outer 3.4 meters of the 8.4-meter blank. The inner 5 meters (except for a central perforation) is the f/0.83 tertiary. The unique f/1.0 secondary is a ringed convex mirror 3.4 meters in diameter with a 1.8-meter perforation. Three giant correcting lenses remove spherical aberrations and provide the camera with a flat 3.5° field.

The front lens is 50% larger than the primary lens of the Yerkes refractor. A filter wheel with six 0.76 meter filters sits in front of the last corrector lens.





The 3.2 gigapixel camera's resolution is 0.2 arcseconds per pixel, but with the telescope still peering through atmosphere even at its elevation of 2,647 meters (8,684 feet) the actual resolution will be about 0.7 arcseconds per pixel, still phenomenal.

The images were released on June 23rd at a meeting in Washington. It was broadcast to 300 "watch parties" around the world. I was invited to one at Columbia University. About 90 people gathered in 309 Havermeyer, the lecture hall where I took introductory chemistry and organic chemistry in the 1960s. The place had good karma: I aced both courses.

Astronomers at Columbia, CUNY, and Rutgers are working in a consortium as part of the LSST. Before the official videocast, there were presentations by five astronomers on research areas on which LSST will have a major impact. Jeno Sokoloski (Columbia) discussed how the Rubin Observatory was organizing astronomers around the world to create and manage research programs, make connections for mentoring and training, and administer the precious 3% of observing time reserved for non-LSST investigations.

Saurabh Jha (Rutgers) discussed the dark sector (dark matter and dark energy). Saavik Ford (CUNY) discussed supermassive black holes and how LSST could refine the understanding of active galactic nuclei. Matthew O'Dowd (CUNY) talked about gravitational lensing, and Kishalay De (Columbia) discussed his work on how the accepted model of stellar evolution might not apply in binary systems.

The main event in Washington, D.C. was recorded (https://www.youtube.com/watch?v=QDi9TdimAdI). Various officials, as well as the Chilean ambassador to the United States, made brief speeches. The speakers included Michael Kratsios, Director of the White House Office of Science and Technology Policy. Kratsios is the first person to hold this post without having a PhD in a science field. His speech was pretty good, although as someone who graduated Princeton with a degree in Hellenic studies he ought to have known that Eratosthenes and not Aristotle proved that the Earth was round. In any case he implied that Rubin and the LSST are not in the crosshairs of the proposed reduction of funding for science research.

If you wish, you can skip the introductory comments and go right to the action at 24:29 in the video. Zelijko Ivezik, the director of construction at the telescope, was appropriately chosen to present and discuss the images. They were, as expected, astonishing. The first image shown was a mosaic of part of the Virgo cluster made over seven nights, to demonstrate the capabilities of the instrument. These kinds of images are not the real goal of the LSST. I made a screen shot of the whole image from the observatory's data visualization site, Skyviewer (https://skyviewer.app/) (see page 13). I fed it into astrometry.net, which correctly identified the field and returned its horizontal and vertical dimensions, from which I extrapolated the approximate size of one degree and marked it on the image. Don't enlarge this image on your computer, since as a screen shot it's low resolution. Go to Skyviewer and drill down on the actual image to see the phenomenal detail.

The second picture shown was a mosaic of 678 images of the area in Sagittarius that contains the Lagoon and Trifid Nebulas. It was made over seven nights. Astrometry.net identified the dimensions of the field as 4.67 x 2.86 degrees. The original image, 84,000 x 51,500 pixels, is a 24.14 gigabyte tif file that you can download at https://is.gd/RubinM8M20. However, your computer may not like this gargantuan file and could have difficulty displaying it. A compatible image viewer will take time loading it. The 10,000 x 6,131 image is easier on your resources and will still impress the hell out of you when you enlarge it. There are smaller image files with lower resolution if you just want to get the overall sense of the picture or use it as wallpaper on your computer or phone (or reproduce it in SkyWAAtch).

Rubin image of the Lagoon/Trifid complex

Diffraction ring and artefact around HD 108985, a mag 6.05 star near M49.

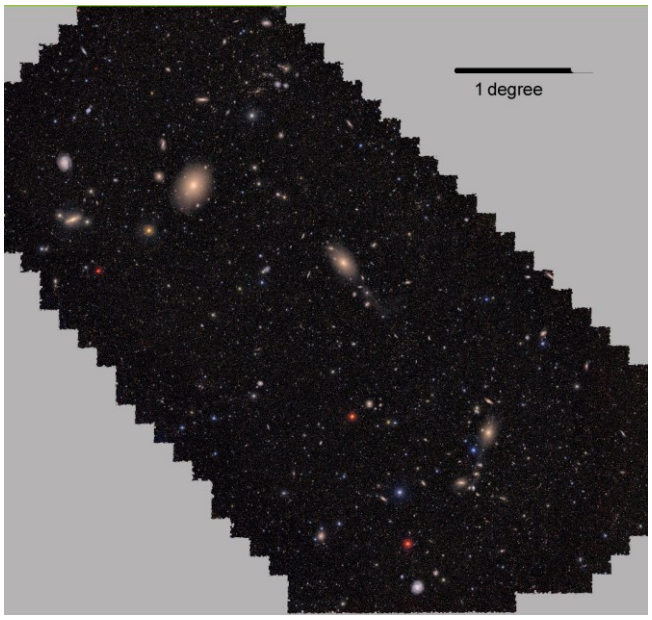
I was told by one of the Columbia astronomers that the camera's pixels saturate at magnitude 16. Bright objects will spill over to adjacent pixels. This means that targeting fields near bright stars will have to be done with care, so it may not be possible to image every square arcsecond of the sky successfully. The resolution and sensitivity for faint objects, like red dwarfs, distant galaxies and galaxy groups, is amazing, To show the leap in sensitivity over prior survey instruments, I made a comparison of Rubin's field around Messier 49 with the same field in the Sloan Digital Sky Survey (see page 13).

Rubin is a survey telescope. Its deepest magnitude is calculated 27.5 in the r-filter band. Scopes that can go deeper (JWST [31], Keck [30], Hubble [30]) are different tools with different scientific goals.

Images and videos that highlighted the telescope's ability to detect changes in position or brightness were presented at the meeting and are also on the Rubin website https://rubinobservatory.org/.

After the watch party and a reception at the Columbia Astronomy department in Pupin Hall, about 35 faculty, post-docs, graduate students (and even one undergraduate) from all three institutions made presentations on how they would use LSST data in their research (I was the only non-professional astronomer!). There was a lot of focus on using machine learning to extract meaningful scientific information from the vast amount of data that will be spilling out of the observatory.

You can learn much more about the Rubin Observatory on their web site. Definitely take a look! ■



Full mosaic (screen shot)

About 1/2500 of a single Rubin field of view.

Messier 49 as seen on the Rubin Observatory mosaic (left) and the Sloan Digital Sky Survey image on CdS (right). (LF)

Rebirth of an Orange Tube C5

Larry Faltz

The story of the phoenix comes from Greek and Egyptian mythology. A fabulously colored and long-lived bird, perhaps a western Chinese golden pheasant fleetingly glimpsed by travelers in distant lands, the phoenix is linked to cycles of death and rebirth. Among the earliest mentions of the bird's longevity of 500 years is in the *Histories* of Herodotus, written around 450 BCE. Some later stories specify that the phoenix is consumed by fire and reborn from its own ashes. Not surprisingly, this aspect of the tale was taken by early Christian writers as an allegory of Christ. We find the phoenix mentioned in Dante's *Inferno*, Shakespeare's *Henry VIII* (the Bard was a co-author of this play), and even Thomas Carlyle's 1835 mock investigative biography *Sartor Resartus*.[1]

Early 1980s Celestron C5 on its fork mount and wedge.

The phoenix came to mind recently when I decided to reanimate my Celestron C5 after two decades in storage. It is a classic "orange tube" instrument (the phoenix is often described as orange or golden). These f/10 scopes established the Schmidt-Cassegrain optical design as the preferred "all-around" scope of the era. The earliest Celestrons, manufactured in California beginning in the 1960s, were shiny white with blue trim, but they took on matte orange plumage with grey trim beginning in 1970. This color scheme lasted until the late 1980s, when the orange paint (three coats on each tube) was found to have a high lead content. Although I don't know anyone who licks their scopes, the lead had to go. The tubes in the next generation of Celestrons became shiny black. Some recent Celestron SCTs have returned to the traditional orange coloration, although with different paint and a glossy surface. During its heyday, Celestron Schmidt-Cassegrain telescopes were made in 5-inch, 8-inch, and 14-inch apertures, with an 11-inch added later. An orange-tube 90-mm Maksutov spotting scope and 5-inch and 8-inch Schmidt cameras (for film astrophotography) completed the product line.

Celestron orange tube SCTs are fork-mounted, the sand-cast fork painted the same grey color as the optical tube's corrector plate housing. The fork's axes move easily and lock solidly with small clutch levers. Large setting circles help you find objects, if you learn how to use them.

Born when computers were the size of cars, these instruments are not "go-to" telescopes. The base (which is the RA axis when the scope is placed on its equatorial wedge) has a 110 volt AC motorized worm drive for sidereal tracking. The declination axis uses a tangent arm. A knob at the bottom of left fork moves the scope up to 5 degrees via a tangent arm, even when the declination axis is locked. Any adjustment more than that requires loosening the clutch and repositioning the tube manually.

I had the thought of doing "piggy-back" film astrophotography, so in 1989 I brought the scope to the Mountainside, NJ home of the late Roger Tuthill, the "astronomer's friend." Roger sold telescope accessories, particularly for Celestrons, many of his own invention. He made a clever reversible declination motor for the scope (for small corrections only) that ran

[1] *Sartor Resartus: The Life and Opinions of Herr Teufelsdröckh in Three Books*. An editor tries to piece together the life of the mysterious Diogenes Teufelsdröckh (Devil's dung) from seemingly random scraps of information. Teufelsdröckh's *magnum opus* is a tome entitled "Clothes: Their Origin and Influence." As arcane as the book is, it had a major influence on the Transcendentalist movement in the US (Emerson, Thoreau, Emily DIckinson and Melville, among others). Your Editor has read it…it's a bit of a slog but humorous, clever and at times profound. It's kind of a 19th century version of a Christopher Guest movie (*This is Spinal Tap*, *Best in Show*, and others.)

on 12 volts. It mounts on the fork arm with two thumbscrews and rotates the tangent arm knob via a small belt (actually an O-ring). The two small tapped mounting holes on the fork arm are nearly invisible so they didn't deface what I always valued as an elegant, harmoniously proportioned instrument, one that might even be chosen for inclusion in an art museum's display of beautiful yet functional scientific tools. Why isn't there one in the design collection of the Museum of Modern Art? To make manual guiding adjustments through the scope at high power, I got an Accutrak 4402 drive corrector with a joystick. This device was one of the first products of what eventually came to be the telescope marketing giant Orion. Like Roger Tuthill, Orion is gone, but us oldsters miss Roger more than Orion. He embodied the spirit of amateur astronomy. I only made a few images with the setup in the early 1990s, all terrible. In any case, with my acquisition of a computerized, go-to 8-inch Celestron CPC800 in 2005, the C5, as beautiful as it was, went into storage.

Like many amateur astronomers, I have a bunch of other scopes and mounts. Wanting a lightweight, quick set-up alt-az mount for lunar, planetary and solar viewing or for traveling, I got a SkyWatcher AZ-GTI. Its 11-pound capacity was perfect for my 60-mm Lunt hydrogen alpha scope, an 80-mm Stellarvue f/6 doublet refractor, and an Orion Apex 127 Maksutov. The Apex, set up with tube rings, diagonal, finder and eyepiece, weighs 10.8 lbs., just below the stated capacity of the AZ-GTI. Although the AZ-GTI seemed to track adequately with the Apex 127, a common rule of mounts is that they should carry only half their stated capacity (because of impacts on tracking accuracy and wear on the gears). In spite of this warning, SkyWatcher sells a 127 Mak (identical to the Apex) mounted on an AZ-GTI, so it must be OK.

Progress has changed how most of us mount and drive consumer-grade telescopes in the field. While there are still a few star-hoppers out there, just as there are some people who still want to drive a car with a manual transmission and a clutch, most of us would like to maximize the throughput of our observing sessions. We're happy to let the mount do the work of finding objects. Mounts today are vastly different than when the C5 was first manufactured, but optics haven't changed. Some optical tweaks have appeared in consumer telescopes in recent years (multi-element objectives with special glass for refractors, corrector lenses for flat fields in the Celestron Edge HD line of SCT's, Ritchey-Chrétien optics in telescopes as small as six inches) but basically telescopes used by amateurs have not undergone major optical changes since the advent of the consumer SCT 60 years ago. So, why not put an old scope on a new mount?[2] The optical tube of the C5 is perfectly modern. Why leave it in a box?

When I was preparing in early June for a trip to Colorado in July that would include some very dark sky observing at Camp Hale,[3] I thought at first about bringing the 80-mm Stellarvue refractor, but more aperture would be better in the very dark SQM 21.8 skies. I used to keep a 6-inch f/5 reflector at a friend's place in Vail, but I sold that some years ago after he decided that there was no room for it in his new condo. I could take the Apex, but then I thought about the C5, in suspended animation, blind for the last 20 years. The SCT optical tube, with its thin corrector plate, weighs 7 pounds with all the attachments, much lighter than the Maksutov. I went on YouTube and found instructions for de-forking the tube. Basically you just remove four mounting screws (although it helps to temporarily remove one of the fork arms, just two more bolts).

I switched the tube rings and dovetail bar from the Apex to the C5, adding a little padding on the inside of the rings for a snug fit and not to mar the orange paint. I needed four 8-32 x ¼" pan head screws to cover the now-vacant fork mounting holes on the mirror cell, to prevent any dust from entering the tube. I couldn't find 8-32 x ¼" screws at my local, otherwise well-stocked, hardware store (Foley's in Larchmont). In any case, to get even one screw in this size, you have to buy 100! They were in stock at Grainger on Route 9A in Elmsford, for $6.31.[4] The C5 in its original configuration had a permanently mounted

[2] As an example, at their site in Westford, MA the Amateur Telescope Makers of Boston has a rare and venerable 6-inch Unitron f/15 refractor on a modern, computer controlled Software Bisque Paramount.

[3] See the August 2010 SkyWAAtch for more about the site.

[4] Needless to say, if you need any quarter-inch 8x32 screws, let me know. Free.

straight through finder. I removed it and bolted (8-32 again) a finder shoe on the mirror cell to use with a 6x30 RACI finder or a laser for alignment.

Now, how to protect the scope during traveling? The old orange tube Celestrons came in a foam padded steamer trunk. These were made of cardboard and were less protective than they appeared, and the brass latches and lock were utterly unreliable. The trunk was long gone anyway. I got a Pelican V550 case, large enough for the scope and critical accessories (finder, diagonal, eyepieces, dew heater strip and controller). I couldn't fit the Astrozap dew shield into the Vault case; a larger case would be too unwieldy. The flexible dew shield, which is not fragile, will have to be shipped with other sturdy necessities, like the tripod, cushioned with bubble roll.

Pelican Vault V550 (22.42"L x 17.46"W x 9.16"H)

The foam inside the Vault case is a higher density material than in the smaller Pelican cases or in aftermarket cases sold on Amazon. Those cases have "pick-and-pluck" foam. With a little planning and a firm but gentle touch, you can easily customize a pick-and-pluck-foam case to protect lighter components like astro cameras. Any mistakes you make or can be repaired with special foam glue, of which Foam Cure from Bob Smith's Industries is an excellent product. Pelican cases have a slightly better quality of pick-and-pluck foam than less expensive cases offered on Amazon under labels like Meijia and Eylar. The price point for these cases is quite a bit lower than Pelican cases. For routine storage of astro equipment and non-rough travel, these cases are adequate.

The foam in the Vault case is higher density than pick-and-pluck foam and comes as two single sheets each about 3½ inches thick, plus a thinner floor layer and a thick flat sheet in the top. You have to custom-cut the foam, and the only effective way to do that is with an electric knife. These were ubiquitous in the kitchens of the late 1950s and 1960s, and you may have inherited one from your parents or grandparents. Mine's a Hamilton Beach, passed down from my late mother-in-law.

It's easy to make a cut, but not that easy to make a *straight* cut or one exactly at right angles to the surface. You obviously have to be very careful not to slice off your fingers. Small indentations, curves and corners can be tricky. You use a piece of chalk to draw the outline of the cut-out you need, later washing the chalk off with water and letting the foam dry.

Interior of my Pelican Vault case for the C5.

When I got the AZ-GTI, I put it in a Pelican 2100 pick-and-pluck foam case, exterior dimensions 14.2 x 11.4 x 6.5 inches, a perfect size for the mount's parts. One of the AZ-GTi's neat features is that it has wi-fi so it can be controlled with an iOS or Android hand-held device (but not Windows). I did that for a while, but I found that dealing with the screen kills my dark adaptation, and pushing the movement "buttons" on the screen is imprecise. So I ordered a hand control. I had a small off-brand hard case that I repurposed (and re-picked-and-plucked) for the hand control, with the assistance of the electric knife and Foam Cure.

If you are flying to an observing site, your options are carry-on, checked baggage, or shipping via FedEx or

UPS. The Vault 550 just meets the TSA maximum size specs for carry-on luggage, but you probably will need your overhead space, if you can get it at all, for other baggage. Even with a high-impact case like the Vault, the risk of checked baggage might be substantial. Airline baggage handlers seem capable of accelerating or decelerating luggage at G forces close to what may be found near a black hole. And baggage fees can now be substantial if you are not a preferred customer with special status on the airline (and you may have several cases for your gear). Many astronomers will send equipment via UPS or FedEx. Several small cases can be packed in the shipping box, reducing cost a bit. And these carriers seem to handle the items more gently than the airlines. It's a good idea to take out extra insurance on valuable items.

Left: small case for AZ-GTI hand control and cable. Right: Eylar case for ASI533 MC camera and accessories.

An advantage of making these foam-lined, custom-designed waterproof armored boxes, besides security in transport, is that you can plan in advance to ensure that you have all the items you need at hand. If you plan the layout properly, you won't be forgetting a critical or useful part like an adaptor, filter, or cable. If you are always transporting your gear by car, a toolbox or plastic storage container would be adequate (although I think cameras need better protection). I use a large toolbox to store all the parts needed for my CPC800 (except tripod and batteries). Within it there are smaller containers for eyepieces, hand control, cables, finder, dew controller, counterweights, etc. If I grab the large toolbox I know I have everything I need to observe. I'll never have the experience of one fellow from Brooklyn who came all the way to Ward Pound Ridge in 2021 with a brand-new 11-inch Celestron, only to find out that he had forgotten the hand control, making the evening a total failure.

AZ-GTI mount in a Pelican 2100 case

For the most elegant solution, you can have cases made to exact specifications for your gear. A local supplier is https://mycasebuilder.com/, which we visited in 2018 (see the June 2018 SkyWAAtch). The cost is higher, but for really valuable gear, complex shapes, or most efficient use of the interior space, it's the best way to go. ■

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The C5, born again, on an AZ-GTI mount!

Observing the Aristarchus Plateau

The Moon on May 11, 2014.
The bright crater near the terminator at 8 o'clock is Aristarchus. (LF)

Many of us tend to look at the Moon when it's eight to ten days old. Just past first quarter, it's fairly high in the sky well before our bedtimes. We might pull out a scope after dinner for a quick look. We naturally tend to focus on dramatic Copernicus and Tycho, with their steep walls and dramatic rays, as well as other craters along the terminator. By the time the Moon gets to day 11 of the lunar cycle, even a small scope needs a neutral density or variable polarizing filter to be viewed without ocular discomfort, unless one is looking at high magnification along the terminator.

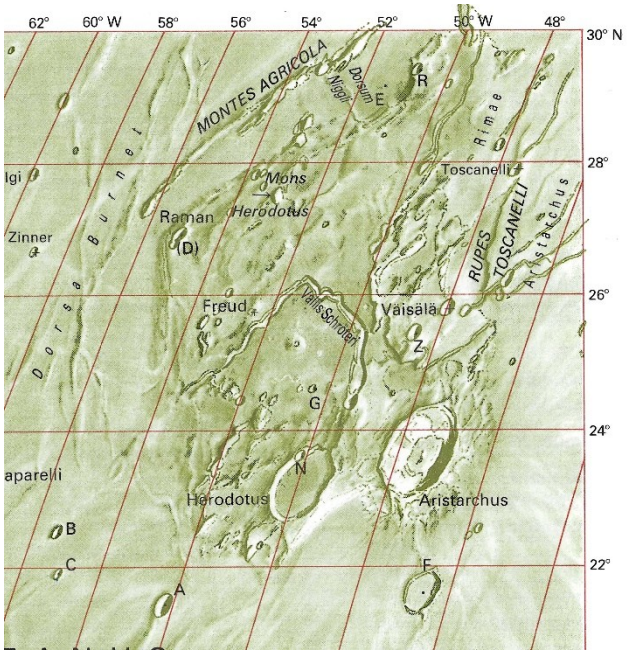
On day 11, along the terminator the walls of the 24-mile wide crater Aristarchus will catch your eye. The crater and its environs are worth exploring, even if you have to stay up a bit later to catch the Moon near the meridian when it is highest in the sky and thus a bit less tarnished by atmospheric seeing problems. Or perhaps you are willing to get up in the wee hours for the 24-day, waning Moon, and examine the crater as lunar night falls on it.

The walls of Aristarchus have a very high albedo, as you can see from the image. The crater can even be seen on a young Moon in earthshine. Like Copernicus, the walls of Aristarchus are nicely terraced. A system of rays is well seen to the southeast, in the direction of Kepler.

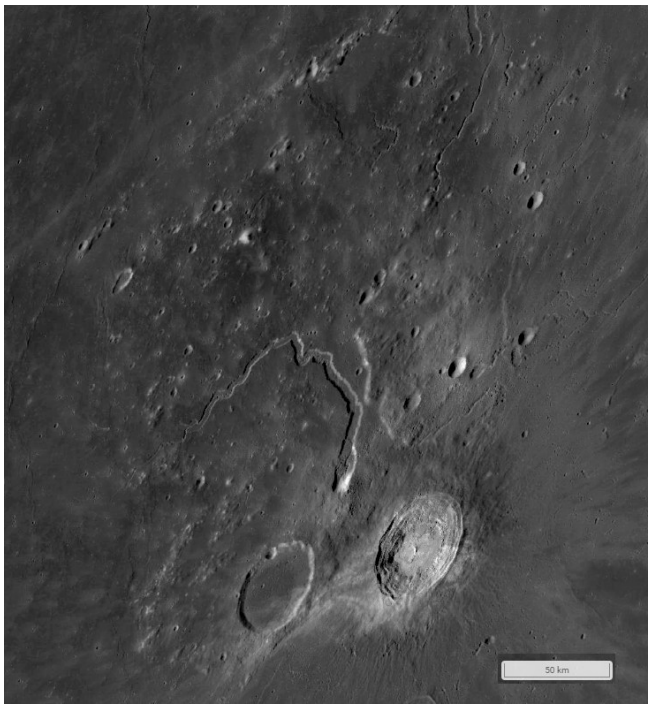
Aristarchus smashed into the Oceanus Procellarum just 150-300 million years ago, making one of the youngest large lunar craters. But it managed to find a rather special place in the vast expanse of basaltic lava that makes up the floor of Procellarum. Aristarchus is at the southeastern edge of a large plateau that bears its name. It was first thought that this plateau is a chunk of lunar crust thrown up by the huge impact that created the Mare Imbrium 3½-4 billion years ago, but recent evidence, gained primarily through remote sensing from instruments on lunar orbiters, suggests that it is volcanic in origin, an area of shield volcanoes.

Left: Shield volcano (Mauna Loa from the top of Mauna Kea).
Right: Stratovolcano (Licancabur, from ALMA Operations Support Facility, Chile). Photos by LF.

Shield volcanoes form when mantle material high in iron and low in silicates is extruded through the crust. The lava flows easily and cools relatively quickly. The best example of an active shield volcano on Earth is Mauna Loa in Hawaii, which is currently spewing lava from the Kilauea and Pu'u 'O'o calderas and other fissures that are forming on the southwest side of the big island. Because of its low viscosity, the lava does not build up into steep mountains, called stratovolcanoes, like in the Andes. Lava forming stratovolcanoes is high in silicates and low in iron.

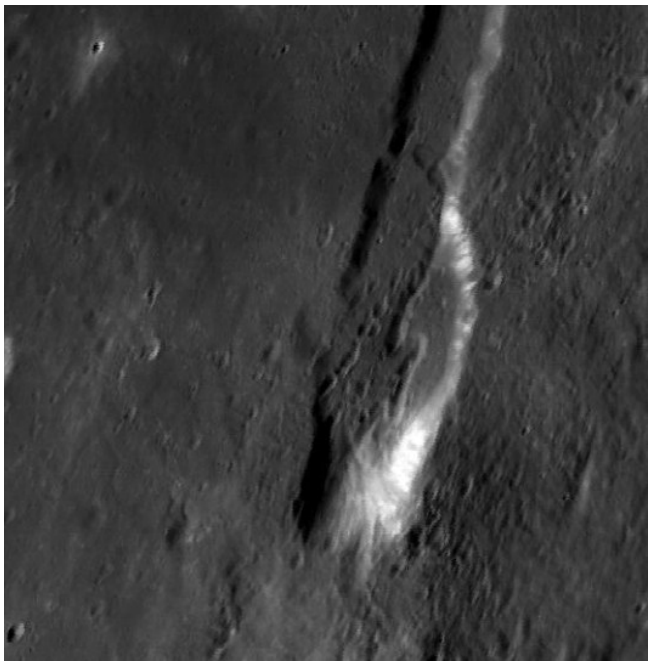


Map of the Aristarchus Plateau, a section of Map 18 of Antonín Rükl's *Atlas of the Moon* (1990)



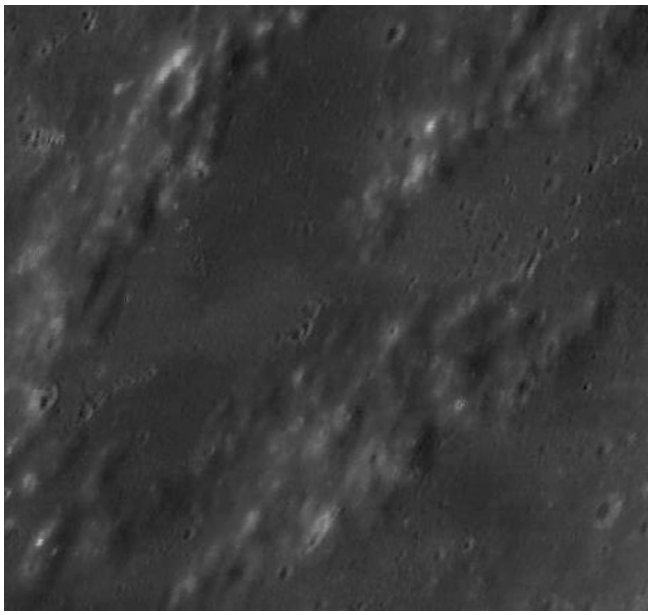
The Aristarchus Plateau (ACT/LROC Quickmap)
https://quickmap.lroc.im-ldi.com/

Winding through the Aristarchus plateau are channels carved out by lava flows. The Vallis Schröteri is the largest sinuous valley on the Moon and can be seen with a small telescope. At its origin, a wider area called the Cobra's Head is about ten kilometers wide. The valley meanders across the lower half of the plateau, narrowing to 500 meters near its end at what appears to be a precipice dropping to the floor of the Oceanus Procellarum. Its total length is 160 km. Within it are several subsidiary channels.



The Cobra's Head (Quickmap)

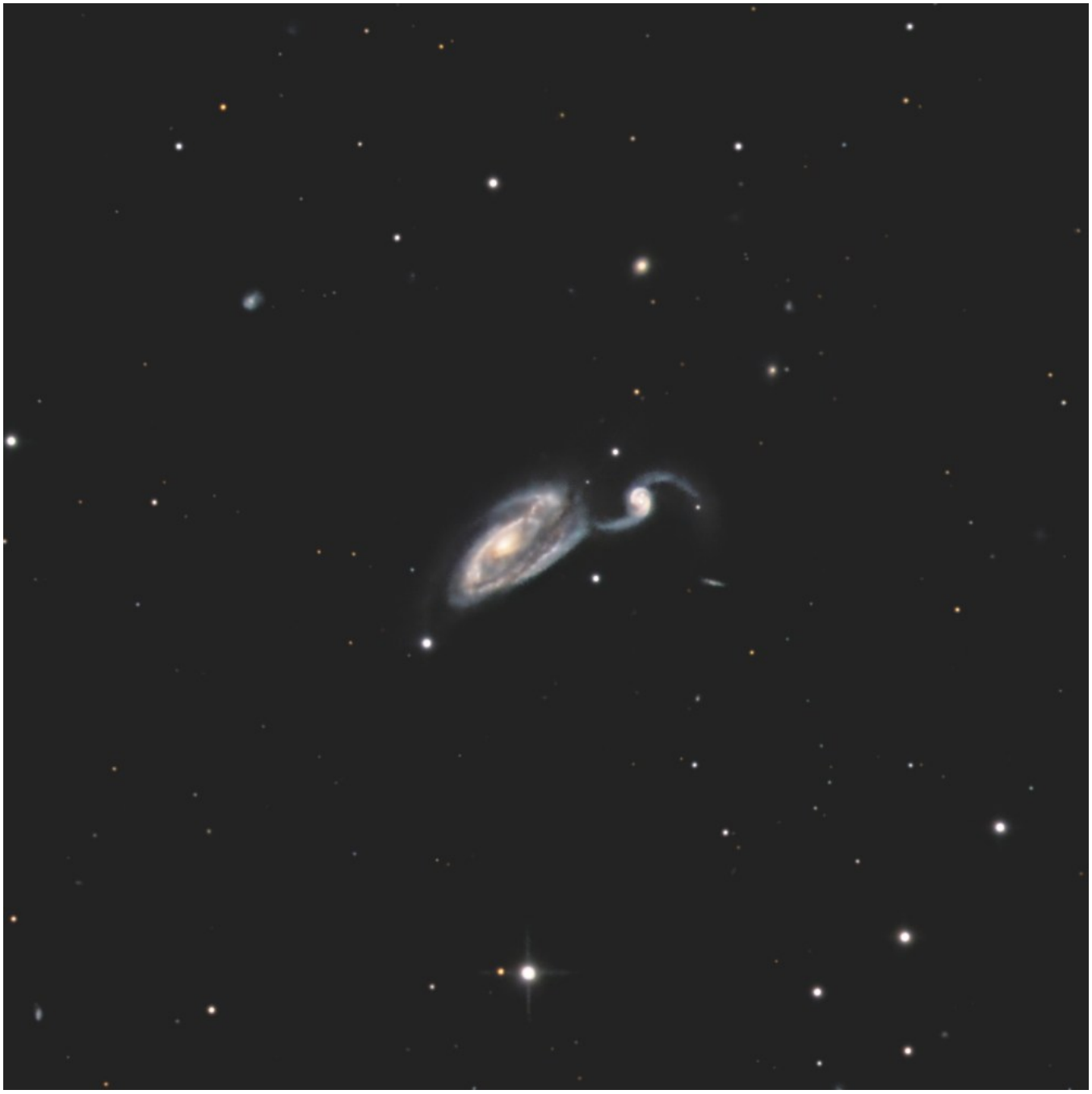
Lava domes dot the surface of the plateau, which also shows evidence of pyroclastic flows. These are mixtures of hot gases, ash and small rocks that move at supersonic velocity. At one time there may have been gigantic lava fountains, which would have been spectacular to see from Earth. ■



Lava domes west of Heroditus crater. (Quickmap)

Images by Members

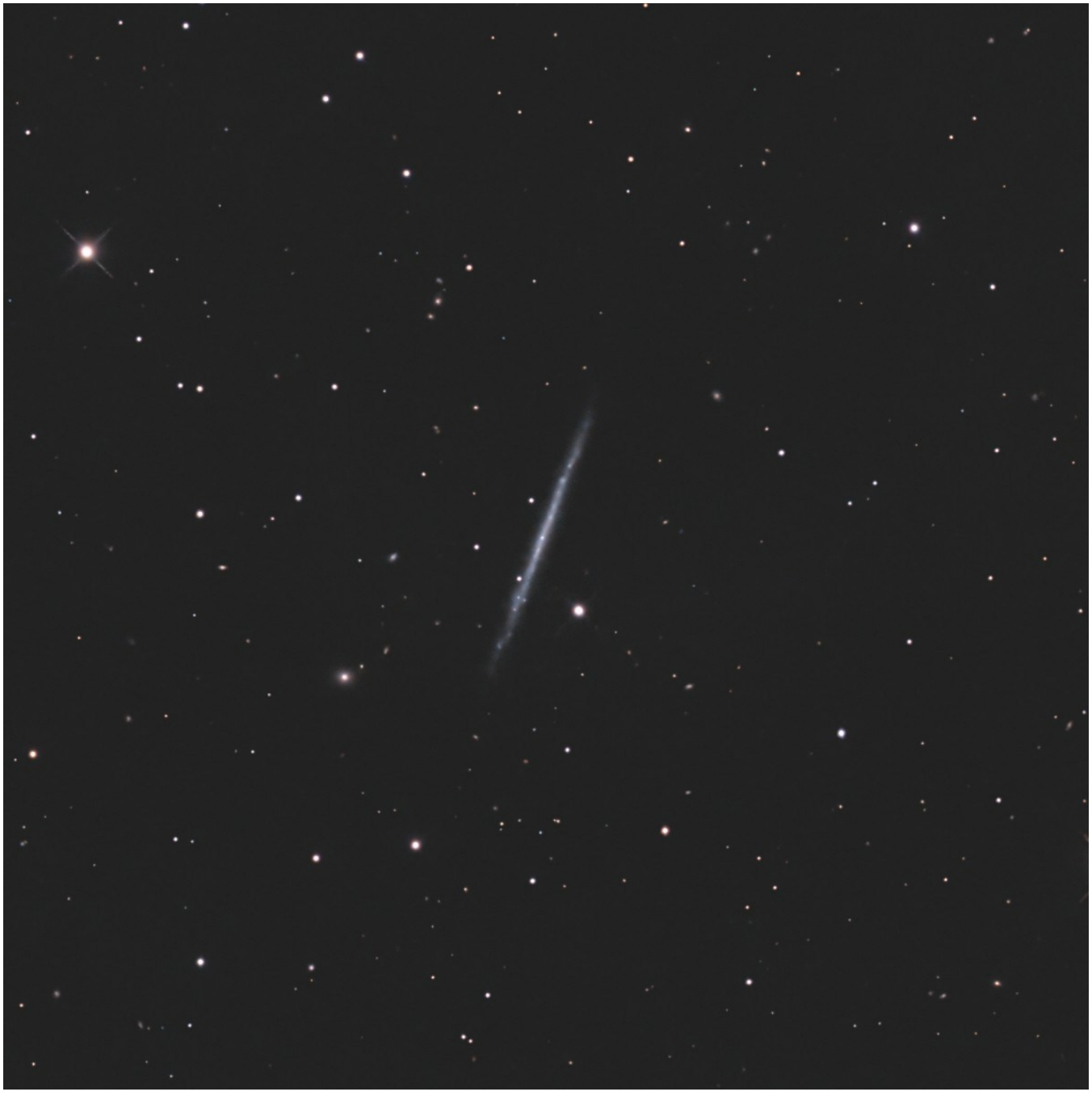
The Heron Galaxy by Steve Bellavia



These interacting spiral galaxies in Canes Venatici are listed as #64 in Halton Arp's *Atlas of Peculiar Galaxies*. NGC 5395 is the heron's body (mag_g=13.07) and NGC 5394 (mag_g=14.193) is the head and beak. Both galaxies are 160 million light years distant from the solar system. It looks like the heron is about to feast on a little fish, the spiral galaxy LEDA 2101092, mag_g=17.6, distance about 670 million light years. The tiny dot at the tip of the beak is not catalogued. The field is 14.7 x 14.7 arcminutes. The fuzzy blob above NGC 5394 is IC 4365.

Full info at https://app.astrobin.com/i/rn1iwp.

UGC 9242 by Steve Bellavia



When the undulatus clouds at Chippokes State Park cleared on May 24-25 (see the June 2025 SkyWAAtch, page 4), Steve got two hours of subs on this rarely imaged edge-on spiral galaxy in Boötes. The galaxy is 5 x 0.3 arcminutes, g-magnitude 14.676, distance 67 million light years. The field of view is 17.6 x 17.6 arcminutes.

A study of several edge-on spiral galaxies with the 0.9-meter telescope at Kitt Peak showed that the hydgrogen-alpha emission from UGC 9242 reached just 4 to 5 kpc above the midplane, a low amount of ionized gas surrounding the disc compared to other edge-on spirals like NGC 891 and NGC 4631. UGC 9242 also exhibits filaments near the bright H-alpha nucleus, an indication of a starburst superwind. (Hoopes, C, Walterbos, R, Rand, R, Diffuse Ionized Gas in Edge-on Spiral Galaxies: Extraplanar and Outer Disk H-alpha Emission, *The Astrophysical Journal*, 522: 669-685 (1999). Preprint at https://arxiv.org/pdf/astro-ph/9904154.

Markarian's Chain by Olivier Prache

Olivier combined 25 hours of subs to make this very deep image of Markarian's Chain. The field of view is 2.32 by 1.54 degrees.

On the left, a detail from the image at the original resolution shows "The Eyes," NGC 4438 and NGC 4435, comprising Arp 20. The field is 8.75 x 10.3 arcminutes with a resolution of 0.438 arcseconds per pixel. The two galaxies are about 52 million light years from the Sun. Simple gravitational interaction between the two does not fully explain the peculiar morphology of NGC 4438. As it moves through the hot intracluster medium, the gas and dust in NGC 4438's interstellar medium undergoes ram pressure stripping, emptying the galaxy of much of its hydrogen. There is even evidence that long ago the galaxy had a gravitational interaction with Messier 86, the large elliptical galaxy to its right in the top image.

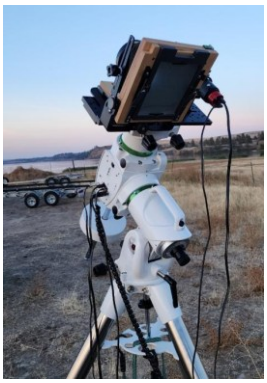
2MASX J12280000+1259054, mag_g18.2 (red markers) and LEDA 168320, mag_g 17.2 (blue markers) area among the numerous distant galaxies in the image, many not catalogued in CdS.

Blasts from the Past by John Paladini

This image of the full Moon was made on June 12, 2025. Going against the grain of current astroimaging practice, John used Fuji 400 color film in a 35-mm film camera attached to a 70-mm Celestron telescope that belongs to his grandchildren. John develops the film himself using the C-41 process.

John notes that "Similar to music records (vinyl LP's) there has been a revival for analog images with the 'avant-garde' artist types. They are the ones keeping film alive for now. Astronomy film shots now is too tiny [a segment of the imaging world] to make any money. The fly in ointment is you still got to scan into digital form to do anything useful."

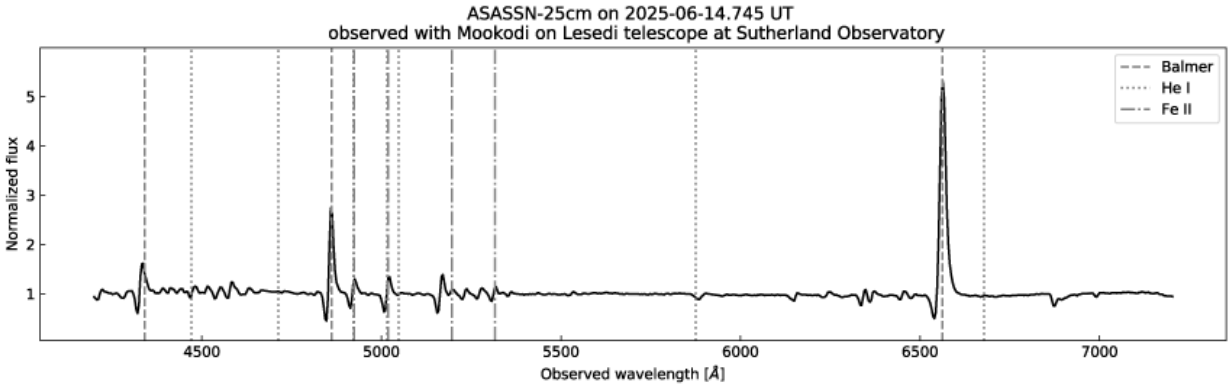
John made this image of the 20-day old Moon (near 3rd quarter) with Kodak XX, a currently available 35-mm movie film that can be spooled into rolls for an SLR camera. The film has an ISO of about 250 under natural lighting conditions and has a reputation for having a wide tonal range in low light. To convert film to digital for display in SkyWAAtch (or any other digital display) a transmission scanning process is obviously needed. It's hard to specify how scanning changes the quality of the image.



There is still a Film Astrophotography forum on CloudyNights. Some people, like John, are persevering. Here's one CN user's idea of the ultimate archaic/modern setup for film astrophotography: a 19th century-type 4x5 plate camera on a 21st century Skywatcher EQ-6 mount! (Submitted by CN member Vostok 1).

New Nova V462 Lupi by Steve Bellavia

On June 12th, the All-Sky Automated Survey for Supernovae, with telescopes in Chile, South Africa, Texas, and Hawaii, detected a new object in the constellation Lupus. Its spectrum (below) showed it was a classical nova, with strong hydrogen emission. An old AAVSO plate showed an object at magnitude 22.7, previously uncatalogued. By June 17th, observers in dark skies could see it with the naked eye at magnitude 6.1. Steve made this image on June 18th at 10 p.m. near his home in Virginia using a 100-mm lens on a Canon EOS SL3 camera, on a fixed tripod, 122 x 2-second exposures and 25 x 2-second dark frames, processed in Nebulosity and PixInsight. The field is 11.2 x 7.47 degrees.



Spectrum by Yusuke Tampo, South African Astronomical Observatory (University of Cape Town). Current AAVSO photometry data is at https://is.gd/V462Lupi.

Omega Centauri by Steve Bellavia

While setting up in Virginia for his image of V462 Lupi on page 25, Steve "stumbled upon" the giant globular cluster Omega Centauri (NGC 5139) very low in the southern sky. The field of view of this image is 9.49 x 6.67 degrees. The brightest star on the left is ζ (Zeta) Centauri.

Date	Crosses meridian
1/1	06:39
2/1	04:34
3/1	02:45
4/1	01:43
5/1	23:41
6/1	21:39

In our area, Omega Centauri, magnitude 3.7, never gets very high in the northern hemisphere, considering that it is at a declination of -47° 28'. Omega Centauri is visible from January to June, with a nearly constant altitude of just 5° 44' when it crosses the meridian. If you want to try to image it, you'll have to wait until 2026 and then either find a high elevation with a view of the southern horizon (but beware of the NYC/Nassau County light dome), or head down to the Long Island south shore (but beware of low-lying ocean clouds and haze).

It has long been suggested that Omega Centauri is the remnant of a disrupted dwarf galaxy. Its mass is much greater than other globular clusters. It contains multiple stellar populations, with a large variation in metallicity, evidence that it probably formed over an extended period of time rather than all at once as is proposed for other globular clusters. Omega Centauri now appears to be associated with a newly discovered (2019) stellar stream, named Fimbulthul.

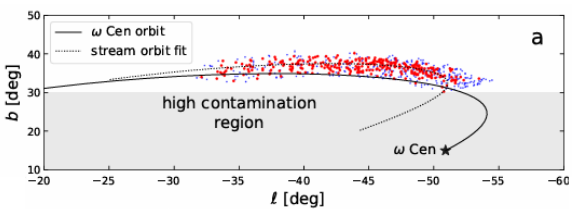


Figure from Ibata, RA, et al, Identification of the long stellar stream of the prototypical massive globular cluster ω Centauri, *Nature Astronomy* 3: 667-672 (2019)

Research Highlight of the Month

Kuang, W, et al., Strong link between Earth's oxygen level and geomagnetic dipole revealed since the last 540 million years, *Science Advances* 13 Jun 2025 DOI: 10.1126/sciadv.adu8826

Abstract: Earth is the only known rocky planet to support complex life forms that use oxygen and to have a strong intrinsic magnetic field in much of its history, prompting speculation that Earth's magnetic field and habitability are related on geological timescales. We search for possible observational evidence for such a relationship by examining evolutions of the virtual geomagnetic axial dipole moment (VAGDM) and the atmospheric oxygen level over the past 540 million years. We find that both exhibit strong linearly increasing trends, coupled with a large surge in magnitude between 330 and 220 million years ago. Our time series analysis and statistical tests show that both are highly correlated, with the maximum correlation reached when there is no time lag between the two. Our findings suggest unexpected strong connections between the geophysical processes in Earth's deep interior, the surface redox budget, and biogeochemical cycling.

The Earth's magnetic field protects us from solar particles and cosmic rays, but this study suggests that it also helps keep oxygen from being lost to space. The geologic record records information on the strength of the magnetic field by examining magnetic crystals in rocks formed from volcanic eruptions. Information on the oxygen content can be derived from ancient charcoals, the result of wildfires that are more likely to occur when the atmospheric content of oxygen is high. Although the atmosphere became oxygen-rich at the Great Oxygenation Event some 2.3-2.5 billion years ago, the data are only available for the Phanerozoic Eon. the past 540 million years. But during this time there were five great extinction events: the Ordovician–Silurian extinction events (439 million years ago [MYA]), Late Devonian extinction (364 MYA), Permian–Triassic extinction event (251 MYA), Triassic–Jurassic extinction event (199 million to 214 MYA) and the Cretaceous–Paleogene extinction event that wiped out the dinosaurs (65 MYA).

This statistical paper argues that the changes in magnetic field strength and levels of oxygen in the atmosphere (now 21%, as high as 35% in the past) are correlated. Among the hypotheses suggested are the solidification of the Earth's inner core, which created greater fluxes in the outer core, raising the magnetic field strength. Plate tectonics may also play a role: the spike between 220-330 MYA correlates with the formation and dispersion of the Pangea supercontinent, which could have affected conditions in the mantle and even the upper core. The findings might inform the search for life on rocky exoplanets.

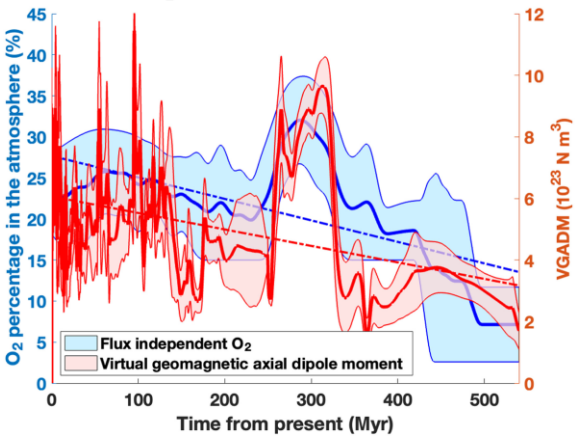


Fig. 1A. Time variations of the oxygen (O2) content and the VGADM in the past 540 million years. Time series of O_2 (blue) and VGADM (red). The solid lines are the mean values, and the banded regions are the data uncertainties. The dashed lines are linear trends.

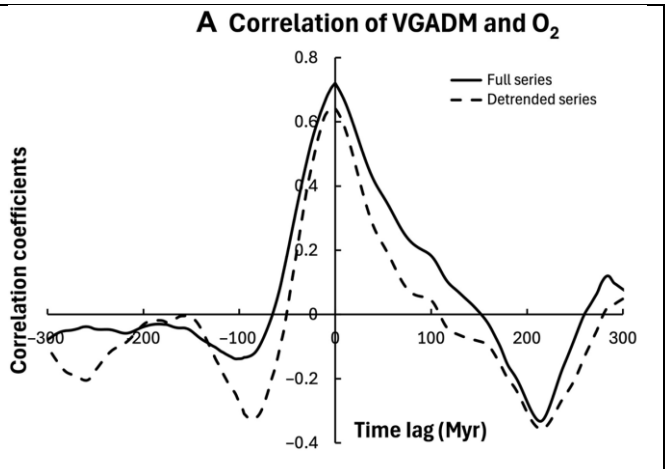


Fig. 2A. Correlation of magnetic field (VGADM) and O_2 with the 10-Myr band-pass filter. Correlogram of the full VGADM and O_2 series (solid) and the detrended VGADM and O_2 time series (dashed).

Member & Club Equipment for Sale

Item	Description	Asking Price	Name/Email
NEW LISTING Celestron CGX-L Go-to EQ Mount	Heavy-duty GEM mount. Steel tripod with 72-mm diameter legs., Wi-Fi adapter, GPS adapter, AC adapter. Extra counterweight, JMI wheelie-bar dolly, spare hand control, vibration pads. Hardware and software have many advanced features. Only used 3 times. Over $6,200 invested. Manufacturer's specifications and image here.	$4,000	Frank Torre ktelectrics@aol.com
Questar 3.5" f/14.6 Maksutov-Cassegrain	A classic. This scope was made in 1979 and has had the same owner since new. Fully reconditioned, including new Pyrex mirror by Questar in April 2025. Broad-band and low reflection coatings. Sliding dew shield with sky map. Brandon 8, 16, and 24 mm eyepieces, 2X Barlow, camera coupling set, table-top tripod (this has been customized to also be used on a regular tripod). Motor drive on RA axis. Includes oak surveyors tripod.	$4,200	Richard Rubin rrubin5@gmail.com
Meade 2080 8" SCT	A complete, nearly mint condition 8" Meade SCT dating from the 1980s. These were rivals of the Celestron orange tube telescopes and were nearly identical optically and mechanically, with a better RA gear system. 110-volt motor drive on the RA axis, tangent arm on the declination axis. Wedge, excellent Bausch and Lomb tripod (better than the fixed height tripod that Celestron used). Aluminum dew shield. Telrad finder. This is a non-go-to scope of classic vintage. Image here. If the non-go-to fork mounting is a disincentive, consider deforking the optical tube and mating it with a new strain-wave drive. New 8" SCT OTA is $1,400.	$400	WAA ads@westchesterastronomers.org
8-inch f/5 reflector optical tube	Celestron-branded Newtonian OTA with tube rings and Vixen style dovetail plate. Can take 1 1/4 or 2" eyepieces. Like new condition. Image here. Donated to WAA.	$100	WAA ads@westchesterastronomers.org
Steel 2" tripod	Standard tripod with post (removable) for azimuth adjustment during polar alignment. Complete with spreader bar. Image here. A new one is $235. Perfect for an upgrade from an aluminum mount. Donated to WAA.	$25	WAA ads@westchesterastronomers.org
6-inch f/5 reflector optical tube	Orion-branded scope. 1.25" rack and pinion focuser. Excellent condition optically and mechanically. New 6" f/5 OTAs cost over $300. Donated to WAA.	$100	WAA ads@westchesterastronomers.org
EQ-4 type German Equatorial Mount (Orion branded)	Little used, if at all. Solid EQ4-type non-go-to equatorial mount with an electric RA drive, slow-motion stalks. The setting circles are large and very readable, unlike most EQ mounts for scopes of this size. An image of the mount head is here. Counterweights, gold-colored aluminum tripod (missing tripod tray, but you can make one easily enough, or even better, buy the steel tripod listed above). Donated to WAA.	$50	WAA ads@westchesterastronomers.org
1.25" Filters	Thousand Oaks LP-3 Oxygen III	$50	Eugene Lewis genelew1@gmail.com
	Astronomic UHC	$75	
	High Point Neutral Density	$10	

Want to list something for sale in the next issue of the WAA newsletter? Send the description and asking price to ads@westchesterastronomers.org. Member submissions only. Please offer only serious and useful astronomy equipment. WAA reserves the right not to list items we think are not of value to our members. All receipts for items owned by WAA goes to support club activities.

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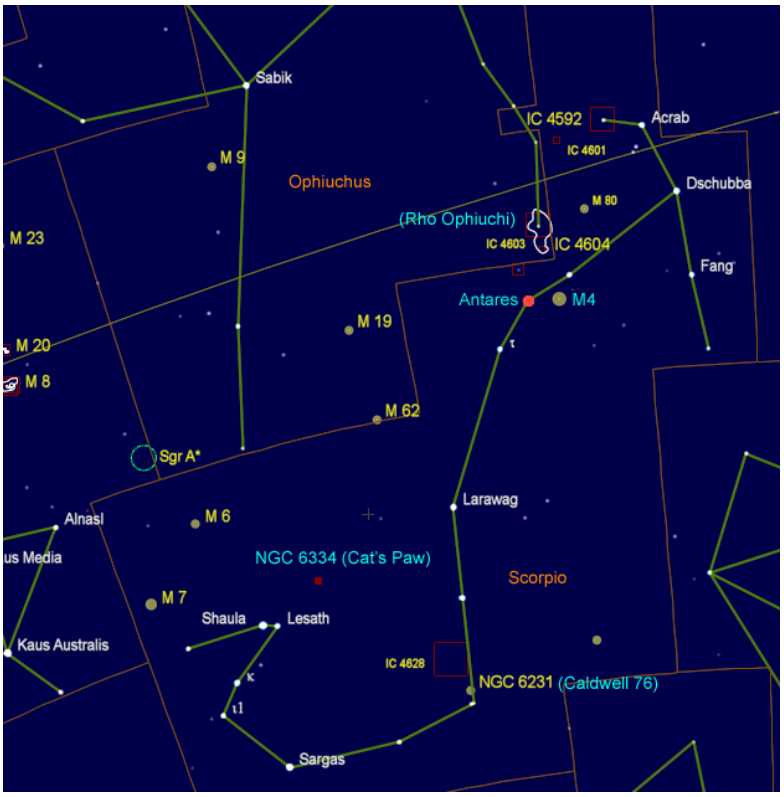
July's Night Sky Notes: Spy the Scorpion

Kat Troche

As summer deepens in the Northern Hemisphere, a familiar constellation rises with the galactic core of the Milky Way each evening: Scorpius the Scorpion. One of the twelve zodiacal constellations, Scorpius contains many notable objects, making it an observer's delight during the warmer months. [However, in Westchester it is always low to the south, and caught in the skyglow from New York City. Nevertheless, its brighter objects are visible from Ward Pound Ridge.—Ed.] Here are some items to spy in July:

- **Antares:** referred to as "the heart of the scorpion," this magnitude 1.06 supergiant has a distinct reddish hue and is easily visible to the naked eye. If you have good skies, try to split this binary star with a medium-sized telescope. Antares is a double star with a white main-sequence companion that comes in at magnitude 5.4, separation 3 arcseconds.
- **Messier 4:** one of the easiest globular clusters to find, M4 is the closest globular to Earth at just 5,500 light years. With a magnitude of about 5.6 and spanning almost half a degree of sky, you can spot this with a small or medium-sized telescope in average skies. Darker skies will reveal the bright core. Use Antares as a guide star for a short trip across the sky just over one degree to the west.



- **Caldwell 76 (NGC 6231):** If you prefer open star clusters, locate C76, also known as the Baby Scorpion Cluster, right where the "stinger" of Scorpius starts to curve. At a magnitude of 2.6, it is slightly brighter than M4, albeit smaller (about 13 arcminutes), and can be spotted with binoculars and the naked eye under good sky conditions.
- If you have an astrophotography set up, try to capture the **Cat's Paw Nebula (NGC 6234)** near the stinger of Scorpius. You can also go for the **Rho Ophiuchi cloud complex** in the nearby constellation Ophiuchus. Its full extent surrounds Antares, which is on the southern side this wondrous structure. It's a star-forming region just 460 light years from us.

Messier 4

Caldwell 76 (NGC 6231)

Cat's Paw Nebula

Rho Ophiuchi Cloud Complex

Manaiakalani

While many cultures tell tales of a "scorpion" in the sky, several Polynesian cultures see the same stars as the demigod Māui's fishhook, Manaiakalani. It is said that Māui didn't just use his hook for giant fish in the sea, but to pull new islands from the bottom of the ocean. There are many references to the Milky Way representing a fish. As Manaiakalani rises from the southeast, it appears to pull the great celestial fish across a glittering sea of stars.

Measure Your Darkness

While you can use smartphone apps or dedicated devices like a Sky Quality Meter, Scorpius is a great constellation to measure your sky darkness with! On a clear night, can you trail the curve of the tail? Can you see the scorpion's heart? Use our free printable Dark Sky Wheel,[5] featuring the stars of Scorpius on one side and Orion on the other for measurements during cooler months. You can find this resource and more in the Big Astronomy Toolkit.[6] ■

[5] https://nightsky.jpl.nasa.gov/club/news/337/
[6] https://nightsky.jpl.nasa.gov/news/341/