



Reflections

The Newsletter of the Popular Astronomy Club

ESTABLISHED 1936

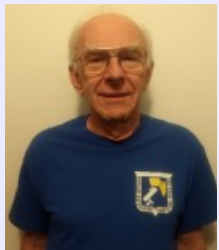


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June 2022

REFLECTIONS from the President



Dale Hachtel

On May 13 and 14, nine members of the Popular Astronomy Club traveled to Port Washington, Wisconsin, to attend the NCRAL Vision

2022 convention. It was good to get together in person again, after a delay of two years due to COVID restrictions.

The Northern Cross Science Foundation hosted the convention, providing speakers on a variety of topics to educate amateur astronomers on ideas for club activities, astrophysics and observing developments, and future technology. An observatory tour, lunch and banquet buffet rounded out the agenda.

Presentations at the convention described activities and tools that could be used in welcoming new club members, improving operations of the club, expanding outreach activities, and finding additional resources. Technical presentations included astrophysics

of star formation and astronomical observations at radio, infrared, and gamma ray frequencies.

The banquet presentation informed us of the Ice Cube Neutrino Observatory in Antarctica.

Dr. Dennis Roscoe presented a very interesting and informative talk on Next Generation Telescopes, and he has now agreed to present an updated talk on this topic at our annual PAC banquet in October.

In addition to the technical sessions, the attendees visited the Jim & Gwen Plunkett Observatory at nearby Harrington Beach State Park. Although the sky clouded up while we were there, the opportunity to see their observatory was interesting.

We hope to use ideas presented at the convention in improving the operation of our club.

Upon returning home, our Niabi

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(From left) Roy and Jan Gustafson, Wayland Bauer and Dale Hachtel visit the Plunkett Observatory during last month's NCRAL Convention.



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PAC members get together for dinner during last month's NCRAL Convention.

Reflections

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public observing session for May brought out about 40 interested observers, although the cloud cover increased as the night progressed and we were limited on what we could see.

We have many public outreach programs planned this summer with various groups and organizations. Please consider helping at these events.

For our monthly meeting in June, we have Geoff Chester of the U.S. Naval Observatory to present "Sky With Ocean Joined: Scaling the Stars at the U.S. Naval Observatory, 1830 to the Present."

In July we have planned an "Update on the OSIRIS-Rex Mission" by Delores Hill of the University of Arizona Lunar & Planetary Laboratory.

There are only a few days left to contribute to PAC through the Birdies for Charity program. Donations are due by June 10 if you participate in the birdies guess. Donations only, without the birdies guess, can still be made until the tournament date.

Keep looking up!

ANNOUNCEMENTS / INFO



NCRAL Seasonal Messier Marathon Program

NCRAL's Seasonal Messier Marathon observing program is NOT designed to qualify observers for the Astronomical League's Messier Observing program; the two programs are unrelated and observing requirements are quite different. In the NCRAL program, the main requirement is to quickly observe and essentially check off items from one of four seasonal lists of Messier objects as noted in the section to follow.

NCRAL recognition will consist a suitable printed certificate and a 3/4-inch enameled star pin (a different color for each season). There will be no direct cost to the membership for participating in the award program; the cost of the program (pins, certificates, mailers, postage) will be borne by the Region as a benefit of affiliation. Relevant program documents are linked below

[NCRAL Seasonal Messier Marathon Rules](#)

[NCRAL SPRING Seasonal Messier List](#)

[NCRAL SUMMER Seasonal Messier List](#)

[NCRAL AUTUMN Seasonal Messier List](#)

[NCRAL WINTER Seasonal Messier List](#)

HOW'S THE WEATHER?



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It's Milky Way season

Summer is a good time to view our home galaxy

It's June, so we're in the middle of Milky Way season. No, this isn't the best time to enjoy the popular nougat-filled candy bar (that's year-round), but rather the time when we get the best view of our home galaxy.

From April to September, the Milky Way is nearly overhead, appearing as a hazy stream of light up to 30 degrees wide radiating from the south to southwest.

When we view what we call the Milky Way, what we're actually seeing is a portion of the galaxy that our Earth calls home, also known as the Milky Way.

Every individual star we see in the night sky is contained within the Milky Way galaxy. The stream of light which we dub the Milky Way, and which Chinese astronomers called the "Silver River," is made up of stars that are too distant to resolve individually with the naked eye, and that are located within one of the galaxy's spiral arms.

From our perspective, the center of the Milky Way galaxy can be found in Sagittarius, one of the constellations in the Zodiac. Just last month, astronomers captured the first image of "Sagittarius A*," a massive black hole at the center of the Milky Way which the you



These photos of the Milky Way (above, below left) were taken last summer by Alan Sheidler during a trip to Zion National Park in Utah. A time exposure of 25 seconds was used to capture these images, so the Milky Way won't look like this to the naked eye; still, it is clearly visible on clear, moonless nights in places far from city lights.

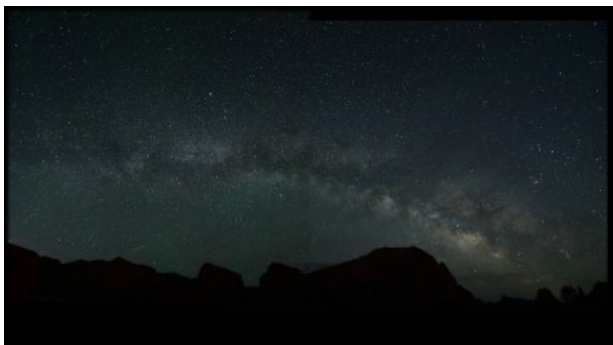
galaxy revolves around.

The name "Milky Way" for the stream of light in the sky goes back to ancient Greece. Greek legend has it that the Milky Way came from milk spewed from the breast of Hera, the goddess of women and marriage who was the wife of Zeus, and one of his many lovers.

The term "Milky Way galaxy" is, in fact, a bit redundant. That's because the word "galaxy" is rooted in "gala," the Greek word for milk.

Until about 100 years ago, there was no need to pluralize the word "galaxy," as astronomers thought that the Milky Way was the one and only galaxy and that it made up the observable universe. This is understandable when you consider that it takes about 100,000 years for a beam of light to travel across the Milky Way, and that our home galaxy contains billions of stars and a countless number of other celestial objects.

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Milky Way

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As vast as the Milky Way was, astronomer Edwin Hubble believed that it was not the only galaxy, and that many of the objects then classified as “nebulas” and thought to be clouds of gas were, in fact, separate galaxies outside the Milky Way. In the 1920s, Hubble conclusively proved his theory, and his fellow astronomers soon found and imaged many other galaxies.

Today, it’s estimated that there are at least 100 billion galaxies in the universe, and probably many more. This means that there are at least a dozen galaxies for every person now living on Earth.

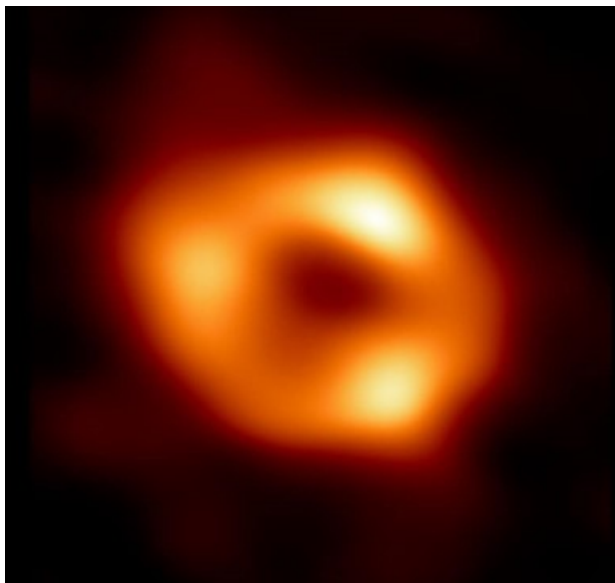
We now know that the Milky Way is a barred spiral galaxy, a fairly common type of a fairly average size. But we’ve also found that every galaxy we study has unique characteristics that set it apart, just as all of us are individuals.

The rustic origin of the Milky Way galaxy’s name harks back to a time when most people lived on farms or in rural villages, and so could easily see the stream of light in the sky when they looked up on clear, moonless nights in the spring and summer. Back in those days, even city dwellers could raise their heads and see the Milky Way as they traversed darkened streets.



Then along came progress, which brought with it artificial lighting and a massive population shift from the country into

In Greek mythology, the Milky Way was formed from breast milk produced by the goddess Hera.



In May, NASA’s Event Horizon Telescope took this image of Sagittarius A*, the massive black hole at the center of the Milky Way.

urban and suburban areas. As a result, it’s estimated that nearly 80 percent of Americans, including those of us residing in the Quad Cities metro area, now live in places where viewing the Milky Way is virtually impossible due to ambient light – a figure that is sure to increase as we continue to grow in number and spread further out.

So if you do want to see the Milky Way, you will have to travel to a place far away from city lights. Choose a night when the skies are clear and a time when the moon is below the horizon, as the glare from a full moon can wash out the Milky Way as sure as a streetlamp can.

Looking up at the Milky Way makes me wonder if there are any alien astronomers observing from one of those many other galaxies, seeing our galaxy from an outside viewpoint that we cannot share. If so, perhaps they are wondering who might be looking back at them.

Paul Levesque

SUMMARY OF PAC MAY MEETING

The Popular Astronomy Club held its regular monthly meeting on May 9 at 7 p.m. at the Butterworth Center in Moline. Seven PAC members attended the meeting “live,” with another 14 joining via Zoom, including members of other astronomy clubs in the region.

After working through some technical issues in regard to recording the meeting, PAC president Dale Hachtel called the meeting to order. Following brief introductory remarks, the meeting proceeded with a feature presentation by Matt Dieterich, technical services manager at PlaneWave Instruments.

The company, based in Adrian, Michigan, manufactures and installs observatory-class astronomical instruments for serious professional and amateur astronomers. Matt stated that the company is growing, with a current workforce of about 75 people working at a recently acquired 57-acre site.

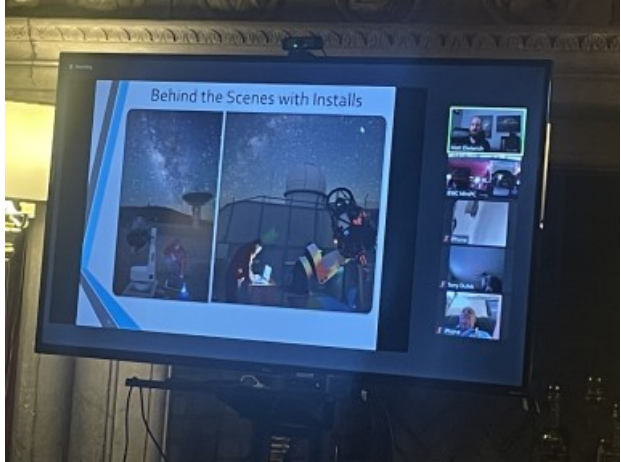
From its headquarters, PlaneWave produces telescopes, mounts, gimbals, instrumentation, and accessories. Matt stated that he and other PlaneWave employees have traveled to many locations across the United States and around the world to install and set up telescopes and related items at observatories.

The current list of PlaneWave customers includes many universities and other educational institutions, as well as a number of government agencies.

Matt said that PlaneWave is focused on improving both the quality of the optics that go into a telescope, and the quality of the tracking that enables a telescope to stay on an object as it “moves” in relation to Earth’s rotation.

Proprietary metals and processes that go into the mirrors in PlaneWave products give them superior optics, Matt said. Tracking is improved, he said, via a direct drive system that operates without gears.

Matt then discussed some of the installa-



During his presentation, Matt Dieterich of PlaneWave Instruments discussed some of the places where the company’s advanced astronomy gear has been installed.

tions he had led, at observatories in California, Chile and other places. He spoke about the stunning views he’d seen and shared photos he and others had taken with PlaneWave telescopes of galaxies, the Milky Way and other objects.

“Growing up in in Pittsburgh, I was never able to see the Milky Way,” he said. “But I’ve always been fascinated by astronomy, and now I’ve been fortunate enough to turn my hobby into my profession.”

Following the presentation, a number of members displayed observations that they had made in recent weeks. Included were photos of the Sun taken by Alan Sheidler and Roy Gustafson, and photos of galaxies taken by Rusty Case and Byron Davies.

Jeff Struve displayed some photos taken during the previous Saturday’s Astronomy Day activities at Bettendorf High School and the Menke Observatory.

Dale noted that the “Skywatch” article published recently in the local newspaper on the upcoming lunar eclipse had recently rated second in popularity on the publication’s website. Paul Levesque said that this showed

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Naval Observatory focus of June meeting

“Sky With Ocean Joined: Scaling the Stars at the U.S. Naval Observatory, 1830 to the Present” will be the subject of the feature presentation of the next general meeting of the Popular Astronomy Club. The meeting will be held on Monday, June 13, at Moline’s Butterworth Center and online via Zoom.

The virtual presentation will be led by Geoff Chester, who serves at the Naval Observatory in Washington, D.C., as public affairs officer, a position he had held since 1997. Previously, Chester worked at the Smithsonian Institution in the Albert Einstein Planetarium.

During his presentation, Chester will outline the history of the Naval Observatory, discuss the current work performed there, and explain how time is kept and how it is used to determine the location of celestial objects.



Geoff Chester has served as public affairs officer at the Naval Observatory in Washington, D.C., since 1997.

May PAC meeting

Continued from Page 5

that “Skywatch” was being read, and encouraged members to submit items both for this monthly feature and for the “Reflections” newsletter.

Dale then reviewed PAC’s upcoming schedule, which includes a number of public outreach events. He asked that members help out at these events.

Before his death, Terry Dufek had asked that his ashes be scattered at Paul Castle Observatory, and that service is being scheduled. Dale also read a touching note received from the mother of a six-year-old boy who lived next door to Terry, and who remem-

bered him through a glow-in-the-dark star mounted on the wall in his bedroom.

Dino Milani briefly discussed a book titled “An Adventure in Faith” by Dr. Robert Frank, a professor at Augustana College. The book of remembrances includes passages on the college’s Gamble Observatory and John Deere Planetarium.

A recording of the meeting is available on YouTube via the following link: <https://youtu.be/zhX3Tlh9AxQ>

The meeting adjourned at 8:35 p.m. The next PAC membership meeting is scheduled for Monday, June 13, at 7 p.m. at the Butterworth Center and via Zoom.

***Thank you
PAC members!***

PAC Friends,

***A sincere thank you for the many cards, emails, concerns
and prayers while I recently received medical treatment.***

I am recovering and doing well. I hope to see you all soon!

Sara Sheidler

Constellations that didn't make the cut

In 1922, the International Astronomical Union announced the names of 88 constellations that would be used to form the boundaries of sky maps going forward. To mark the centennial of adoption of the modern constellation



list, Reflections is looking back at some constellations that were once found on some sky maps, but didn't make the final cut.

Antinous (the Youth) was a constellation placed in the firmament per the order of Hadrian, who served as Roman emperor from 117 to 138 A.D. The constellation honored a young man in the emperor's court who was a favorite of Hadrian and who traveled with him as he toured the empire. Some historians speculate that the relationship between the two was more than platonic; it is certain that Hadrian admired Antinous for his intelligence and that the two shared a love of hunting.

Just short of his 20th birthday, Antinous died under somewhat mysterious circumstances while traveling on the Nile River in Egypt. The bereaved Hadrian ordered that Antinous be deified and that his image be placed among other gods in the night sky.

For centuries afterward, sky charts depicted Antinous just below the constellation Aquila, the eagle. Some charts labeled the constellation as Ganymede, for the youth in Greek mythology who was carried to Mount Olympus in an eagle's talons and who is the namesake of Jupiter's largest moon. Neither name was included when the list of constellations was released, and the stars of this obsolete constellation were incorporated into Aquila's borders.



TERRY'S STAR

I just wanted to share something with you has melted my heart. Terry (Dufek)'s next door neighbors are so kind and wonderful. They have helped in many ways.

They have a wonderful little boy who is 6 years old. His name is Brody. His mother, Amanda, texted me last month to share what happened with her son when he was saying his prayers at bedtime.

He looked up at the ceiling and said, "There is Terry's star" (the one in the middle).

This little boy does not forget. Today, he gave me a dandelion flower and said, "This is for Terry".

This is in line with Terry's thoughts and interests in life. Making an impression about astronomy, even at a very young age, can maybe last a lifetime, as it was with Terry.

God bless you all.

Pam Kollar (Terry's Sister)

MEMBER OBSERVATIONS & CLUB ACTIVITIES



Rusty Case, Al Sheidler, Ally Nordick and Ken Boquist gathered at Castle Observatory the evening of May 15 to observe the lunar eclipse. Along with this photo of the "blood moon," Al also captured a video of the moon occulting the double star double star HIP76033.



Mike Gacioch took these eclipse photos from his driveway in Moline, using a Canon 7D Mark II camera and 100-400 lens at 400mm. The partial eclipse photos were taken at f800 while the total eclipse photos were taken at f1600.



Dale Hachtel captured these images of the lunar eclipse from his home in Port Byron by connecting his smartphone to PAC's Apogee 3-inch refractor with a 13mm eyepiece.



Dino Milani captured this nice image of the eclipse from the American Doll and Toy Museum in Rock Island from his 5-inch refractor with a 625 mm length at F-5, using a Canon D6 Mark II camera, full frame set at ISO 100 for ten seconds.

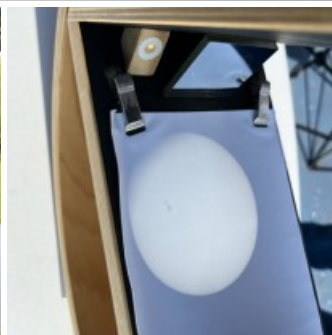


Here are two photos taken by Paul and Dawn Levesque just outside their home in Moline, using a Nikon D5600 camera set up on a tripod.

MEMBER OBSERVATIONS & CLUB ACTIVITIES



We've seen plenty of cold, wet weather this spring, but Astronomy Day on May 7 brought clear skies. The Quad Cities Astronomical Society celebrated the day with a public outreach event at Bettendorf High School that featured plenty of solar viewing. The astro-party continued into the night at Menke Observatory, where Byron Davies and Rusty Case joined their fellow amateur astronomers to take advantage of the starlit skies.



On May 21, PAC participated in a STEM event for Scouts at Loud Thunder Forest Preserve. The cleared toward the end of the day, allowing for solar observing and seeing some sunspots. Nearly 200 kids and adults visited the PAC display. Thanks to PAC members Rusty Case, Roy Gustafson, Dale Hachtel and Dino Milani for spending their Saturday supporting the event, and to John Schaub for running the observatory.

Dale Hachtel helps set up for an observing session at John Deere Middle School in Moline on May 3. While the seeing conditions were less than ideal, the event still served as an opportunity to introduce astronomy to some local students and their parents. PAC holds events at the school regularly under terms of a partnership formed last year between the club and the Moline School District.

MEMBER OBSERVATIONS & CLUB ACTIVITIES



The PACMO was set up May 28 at the American Doll and Toy Museum for a public outreach event that attracted about 30 people. PAC members Ken Boquist, Dale Hachtel Al Sheidler, and Dino and Ellen Milani were there to answer questions and do some astrophotography. Shown are photos of the M92 globular cluster, the Ring Nebula and Polaris; the latter image sparked a discussion about binary star systems.



May 21 was a chilly, windy night with partly cloudy skies, but the monthly public observing session at Niabi Zoo went ahead anyway and attracted about 40 people. Shown is the group photo taken at the event.

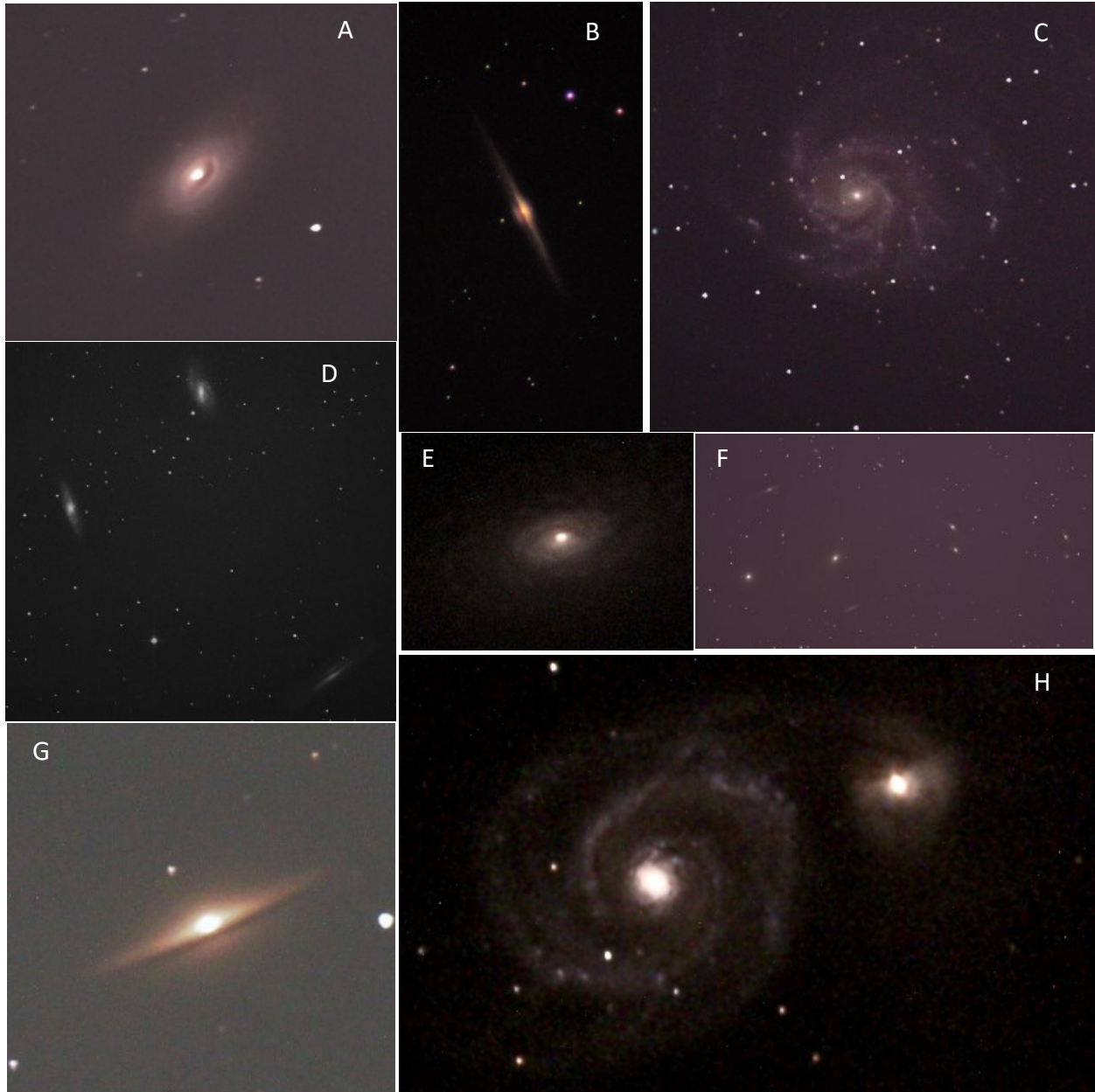


At left is an image captured by Rusty Case that shows NGC 4631, the Whale Galaxy, and its companion NGC 4627, the Spout; the Hockey Stick Galaxy (NGC 4656) is shown in the upper corner. The above image of NGC 3521 (the Bubble Galaxy) was taken by Roy Gustafson on May 7 using Stellina.

During the lunar eclipse observing session at Castle Observatory, Al Sheidler took these photos of some carbon stars.



MEMBER OBSERVATIONS & CLUB ACTIVITIES

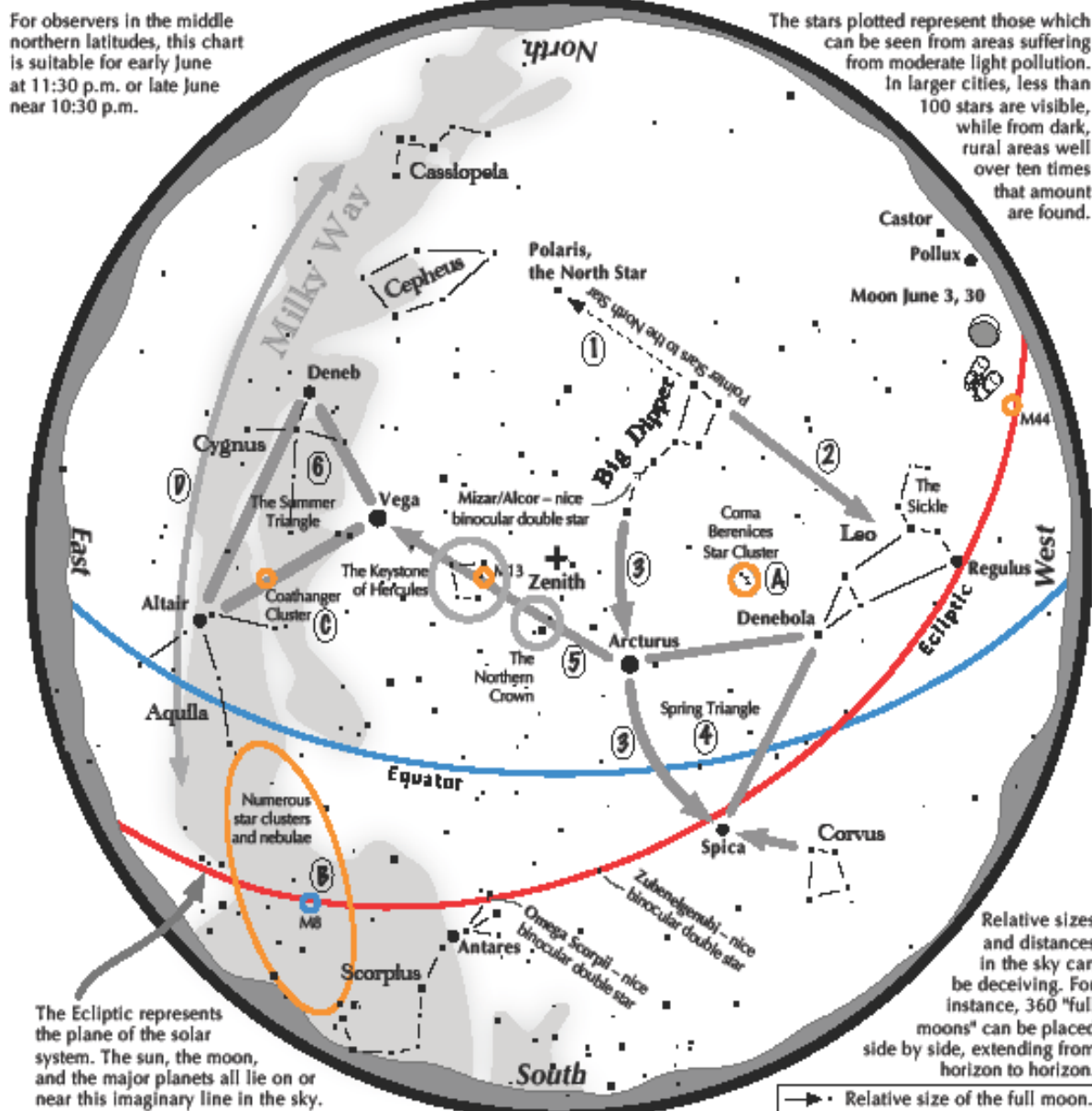


Here's a collection of astrophotos of galaxies taken in recent weeks by Byron Davies. Shown are (A) the Blackeye Galaxy (M64); (B) the Needle Galaxy (NGC 4565); (C) the Pinwheel Galaxy (M101); (D) the Leo Triplet (M65, M66 and NGC 3628); (E) the Sunflower Galaxy (M63); (F) Markarian's Chain (part of the Virgo Cluster); (G) the Sombrero Galaxy (M104); (H) the Whirlpool Galaxy (M51A / NGC 5194). Great work, Byron; thanks for sharing!

Navigating the June Night Sky

For observers in the middle northern latitudes, this chart is suitable for early June at 11:30 p.m. or late June near 10:30 p.m.

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



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

- 1 Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Draw another line in the opposite direction. It strikes the constellation Leo high in the west.
- 3 Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the June evening sky, then Spica.
- 4 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
- 5 To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 6 High in the east are the three bright stars of the Summer Triangle: Vega, Altair, and Deneb.

Binocular Highlights

- A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
- B: Between the bright stars of Antares and Altair, hides an area containing many star clusters and nebulae.
- C: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
- D: Sweep along the Milky Way for an astounding number of faint glows and dark bays.

Astronomical League www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.





**June
2022**

An Eclipse Can't Be Beat

Nothing in the night sky quite beats a total eclipse of the Moon. Other than a shooting star, eclipses prove to all who watch them that the sky is a changing place.

During the several hours of a lunar eclipse, we can actually watch as the Moon slowly orbits the Earth. As it passes through the shadow of the Earth, we can enjoy its changing illumination.

Sunday, May 15 featured a total eclipse of the Moon. It was perfectly timed for observers throughout most of North America.

On the east coast, the eclipse began in mid-evening. For those of us who live in Arizona, in the great American Southwest, the eclipse began just as the Moon was rising, and it ended late in the hours of the evening.

As the Moon marched its way eastward, the penumbral shadow manifested itself as a shading, slowly dimming the Moon's light as it spread across the lunar surface. Gradually, the eastward facing limb, or edge, of the Moon grew darker and darker.

About 90 minutes into the event, the full and profound darkness of the umbra, the central shadow of the Earth, struck the Moon's leading edge. Over the next hour or so, the Moon lost much of its light.

Seeing an eclipse of the Moon is not the same as experiencing it. To do that, you need also to notice the sky.

At moonrise, the sky was very bright, with moonlight swamping everything except the brighter stars. But as the eclipse progressed that night, the sky began to darken gradually, then more obviously as fainter stars appeared. Finally, from dark sites, the Milky

Way could be seen.

On a personal note, one of the variable stars I observe, TV Corvi (Clyde Tombaugh's star), cannot be viewed through a telescope when the Moon is near its full phase. But on this night, the darkened Moon let the sky get so dark that I easily got a reading of the field of that star. It was yet another aspect of the magic.

The other part of experiencing the eclipse – a completely unexpected part – is learning just how dark the Moon gets during the total phase. There is a scale, the Danjon scale, which ranges from L= 4, where the eclipsed Moon is so bright that you barely notice that there is an eclipse going on at all, all the way down to L=0, during which the Moon is barely visible.

If the Earth has suffered a serious volcanic eruption in the months preceding an eclipse, the volcanic dust still remaining high in the Earth's atmosphere can seriously darken the shadow. I saw one such eclipse on the morning of December 30, 1963. Thanks to the eruption in February 1963 of Indonesia's Mount Agung volcano, at mid-totality the Moon simply disappeared. Observing from a rural site, my friend Constantine Papacosmas said that the eclipsed Moon was no brighter than a 5th magnitude star.

A few months ago, Mount Hunga Tonga-Hunga Ha'apai, a gigantic undersea volcano about 60 miles north of Tongatapu, Tonga's main island, erupted and spewed lots of dust into the upper stratosphere. For this

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Wendee Levy took this photo of the moon rising over a saguaro cactus in her backyard just as the May 15 lunar eclipse began.



Solstices create ‘zero shadow’ days

Solstices mark the changing of seasons, occur twice a year, and feature the year’s shortest and longest daylight hours – depending on your hemisphere. These extremes in the length of day and night make solstice days more noticeable to many observers than the subtle equality of day and night experienced during equinoxes.

Solstices were some of our earliest astronomical observations, celebrated throughout history via many summer and winter celebrations.

Technically, a solstice is not a day but a moment in time. This year’s summer solstice will on June 21 at 4:13 am Central Daylight Time (9:13 UTC), while the winter solstice occurs on December 21 at 3:48pm Central Standard Time (21:48 UTC).

The June solstice marks the moment when the Sun is at its northernmost position in relation to Earth’s equator, while the December solstice marks its southernmost position. The summer solstice occurs on the day when the Sun reaches its highest point at solar noon for regions outside of the tropics, and those observers experience the longest amount of daylight for the year. Conversely, during the winter solstice, the Sun is at its lowest point at solar noon for the year, and observers outside of the tropics experience the least amount of daylight – and the longest night – of the year.

The June solstice marks the beginning of summer for folks in the Northern Hemisphere and winter for Southern Hemisphere folks; in December the opposite is true, as a result of the tilt of Earth’s axis of rotation. This means that the Northern Hemisphere receives more direct light from the Sun than the Southern Hemisphere around and during the June solstice.

Earth’s tilt is enough that northern polar



PHOTO BY JUAN VELÁZQUEZ

A presenter from the San Antonio Astronomy Club in Puerto Rico uses a globe to demonstrate the solstice’s effect during a “Zero Shadow Day” event. Puerto Rico’s two zero shadow days arrive just a few weeks before and after the summer solstice.

regions experience 24-hour sunlight during the June solstice, while southern polar regions experience 24-hour night, deep in Earth’s shadow. That same tilt means that the Earth’s polar regions also experience a reversal of light and shadow half a year later in December, with 24 hours of night in the north and 24 hours of daylight in the south. These extreme lighting conditions can last for months, with their duration deepening the closer you are to the poles.

While solstice days are very noticeable to observers in middle to high latitudes, that’s not the case for observers in the tropics, defined as those areas of Earth found between the Tropic of Cancer and the Tropic of Capricorn. Instead, individuals experience two “zero shadow” days per year.

On these days, with the sun directly overhead at solar noon, objects cast a minimal shadow compared to the rest of the year. If you want to see your own shadow at that moment, you have to jump!

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Solstices

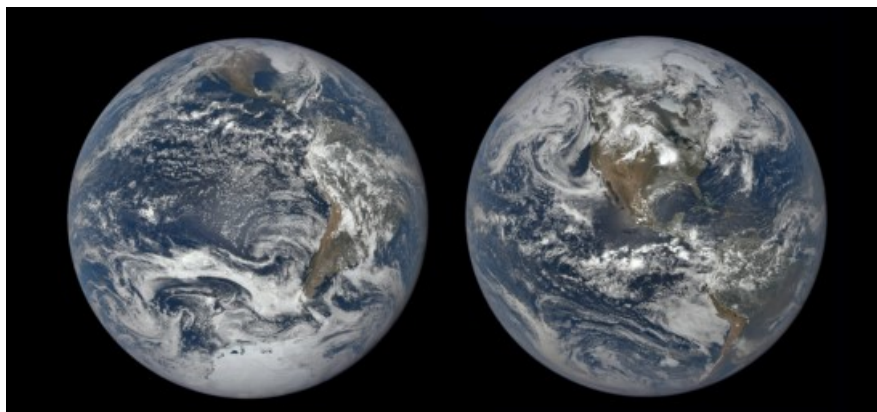
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The exact date for zero shadow days depends on latitude; observers on the Tropic of Cancer (23.5° north of the equator) experience a zero shadow day at the June solstice, and observers on the Tropic of Capricorn (23.5° south of the equator) get their zero shadow day on December's solstice. Observers on the equator

experience two zero shadow days, being exactly in between these two lines of latitude; equatorial zero shadow days fall on the March and September equinoxes.

There is some serious science that can be done by carefully observing solstice shadows. In approximately 200 BC, Eratosthenes is said to have observed sunlight shining straight down the shaft of a well during high noon on the solstice, near the modern-day Egyptian city of Aswan. Inspired, he compared measurements of solstice shadows between that location and measurements taken north, in the city of Alexandria.

By calculating the difference in the lengths of these shadows, along with the distance between the two cities, Eratosthenes calculated a rough early estimate for the circum-



These images from NASA's DSCOVR mission show the Sun-facing side of Earth during the December 2018 solstice (left) and June 2019 solstice (right).

ference of the Earth – and also provided further evidence that the Earth is a sphere!

Are you having difficulty visualizing solstice lighting and geometry? You can build a “Suntrack” model that helps demonstrate the path the Sun takes through the sky during the seasons; the instructions can be found at stanford.io/3FY4mBm.

You can find more fun activities and resources like this model on NASA Wavelength: science.nasa.gov/learners/wavelength. And of course, discover the latest NASA science at nasa.gov.

This article is courtesy of NASA's Night Sky Network program, which supports astronomy clubs across the USA and is dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to learn more.

Skyward: Eclipse

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reason, I estimated the May 15 eclipsed Moon's luminosity as $L = 1.5$. It was the darkest eclipse I have seen since 1963, and my wife Wendee and I thoroughly enjoyed sitting in our observatory watching the wonderful spectacle.

We get to do this all over again in Novem-

ber when a second total eclipse of the Moon will be visible from the Americas. May the sky be clear with the Moon as inviting as it always is. Then you will have another chance to watch the sky in motion, and to watch the world move along not with the trivia and rush of the daily news, but with the slow and solemn, long-term march of cosmic time.

UPCOMING EVENTS



Date: June 13, 2022

Event: Regular Meeting @ 7 p.m.

Location: Zoom / Butterworth Center

Program: "Sky With Ocean Joined: Scaling the Stars at the U.S. Naval Observatory, 1830 to the Present" by Geoff Chester, Public Affairs Officers at the Naval Observatory

All these events, dates and times are tentative and subject to change! Please check your emails for any updates and changes!

MONTH	NEWSPAPER ARTICLES	MEMBER PRESENTATION	MEETING / PROGRAM
JULY 2022	AVAILABLE	AVAILABLE	July 11 - Presentation: "OSIRIS-REx Mission Update" by Dolores Hill, Senior Research Specialist, Lunar & Planetary Laboratory, University of Arizona, Tucson, Arizona

UPCOMING EVENTS

- **June 3:** LeClaire Public Library, 'Stars and S'mores' @ Huckleberry Park
- **June 4:** Giant Goose Recreation Area 'Youth Day' (day event / solar viewing)
- **June 4:** Girl Scout campout at Scott County Park (night event)
- **June 18:** Niabi Zoo public viewing
- **June 23:** Eldridge Public Library, 'Stargazing and S'mores'
- **June 25:** Public viewing at Illiniwek Forest Preserve, sunset
- **July 16:** Niabi Zoo public viewing
- **July 16:** QCAS public viewing at Menke Observatory
- **July 19:** Moline Public Library, Children's Program
- **July 20:** Kewanee Public Library (day event / solar viewing; Space Exploration Day)
- **July 30:** Perseid meteor show public viewing, Pleasant Valley Middle School (QCAS event)
- **August 5:** Davenport Public Library, Eastern Avenue Branch, 'Reading Beyond the Beaten Path'
- **August 13:** Annual PAC Picnic (*no regular monthly meeting*)
- **August 20:** Niabi Zoo public viewing
- **September 23-24:** Eastern Iowa Star Party
- **October 8:** Girl Scout campout at Camp Liberty
- **October 20:** Cambridge Elementary School, 'Lights On After School'
- **October 22:** Annual PAC Banquet (*no regular monthly meeting*); presentation on "Next Generation Telescopes" by Dr. Dennis Roscoe, NASA Solar System Ambassador



This group photo was taken during last month's NCRAL Vision 2022 convention, sponsored by the North Central region of the Astronomical League and held in Port Washington, Wisconsin. See if you can pick out the PAC members who attended the convention: Dale Hachtel, Mike Gacioch, Jan Gustafson, Roy Gustafson, Anne Bauer, Wayland Bauer, and Byron Raser.