Reflections

The Newsletter of the Popular Astronomy Club

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Affiliated with

December 2021

President's Corner: December 2021

Alan Sheidler

It is hard to believe we are finishing up another year already. As I write this, Christmas is just a month away. The winter season is an opportunity for us to reflect on our accomplishments and set goals for next year. The Popular Astronomy Club has much to be proud of and thankful for. I would like to mention a few of the accomplishments, opportunities and benefits enjoyed by club members in the recent past.

Since 2014, I have endeavored to keep track of the club's public outreach activities. Since that year, if my records are correct, the club has conducted 250 public outreach sessions with a grand total of 17,850 visitors. This equates to an average number of visitors per outreach session of 71, which is pretty amazing when you think about it.

Most of these outreach sessions featured telescope observing for the visitors, but there were also presentations, demos, Q&A sessions, and discussions with visitors—all of which were supported by an average of six club members per outreach session. This record of club outreach activity is something of which we can be very proud.

Of course, the Popular Astronomy Club offers many other opportunities for fellowship, learning, and indulging in the hobby. During PAC's regular club meetings, we have had talks from noted astronomers, NASA officials, and educators. COVID-19 forced us to change the way we conducted meetings, so that we now have a "Zoom" component to complement our in-person meetings at the Butterworth Center. This has enabled us to regularly have presenters from as far afield as Hawaii, because they do their talks remotely. Remote access has also enabled an increase in attendance at PAC meetings.

As a member of PAC, you are also automatically a member of the Astronomical League. The AL is an international organization of nearly 20,000 members. It provides many opportunities for learning, networking and fellowship with fellow amateurs.

Examples of this are the Astronomical League Convention (ALCON) and regional con-

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PAC events have attracted more than 17,000 visitors over the past eight years, a total that would likely have been higher without the pandemic.

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CANDIDATES ANNOUNCED FOR PAC ELECTIONS

The Popular Astronomy Club will hold an election for club officers at its next monthly meeting, scheduled for December 13 at the Butterworth Center.

Those elected will serve two-year terms beginning in January. The candidates for each position are as follows:

- **President**: Dale Hachtel
- **Vice President**: Dino Milani
- **Secretary**: Paul Levesque
- **Treasurer**: Mike Haney
- **Observatory Director**: Rusty Case
- **Alcor (Astronomical League Correspondent**: Roy Gustafson

SUBMISSIONS WELCOME!

This is YOUR newsletter, so we want to hear from you! If you have an article or photos to submit, or other items that might be of interest, send them along to Reflections.

Photos and other images should be sent as separate files (attachments) rather than embedded in emails. Send to: levesque5562@att.net

Thank you!

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

H0W'S THE WEATHER?

meteoblue
weather close to you

CLEAR OUTSIDE

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If you have questions or request, or want more information on PAC, send an e-mail to: **popularastronomy-club@gmail.com**

PAC membership has its privileges

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ventions. Next year's ALCON will be in Albuquerque, New Mexico, and the North Central Region of the Astronomical League (NCRAL) Convention will be in Port Washington, Wisconsin.

Recall the last NCRAL convention (NCRAL 2019) was hosted by the Popular Astronomy Club and featured two full days of talks, observatory and planetarium tours, workshops, food, and fun spread out over three days.

Of course I am biased, but I believe NCRAL 2019 was one of the best regional conferences ever! Your membership in PAC entitles you easy access to such "celebrations of knowledge." Stay tuned to club newsletters and emails concerning these and other events.

For those of you who like to get out under the stars and observe, PAC has you covered there too. The recently renovated Paul Castle Memorial Observatory is available for club members to use. PAC also has a number of different telescopes, binoculars, cameras, and other equipment for members to use—you don't even need to own a telescope!

Don't forget we have the PACMO mobile observatory which is used for Niabi Zoo and other public outreach sessions. We are looking for telescope operators, so please let us know if you are interested in learning how to use the PACMO or any of the other scopes PAC has in inventory.

I don't think I am exaggerating when I say the cost of $30 for a single PAC membership has to be one of the best returns on investment anyone can make. The potential for learning, accomplishment, and positive impact on the community are "astronomical." If you have not yet renewed your PAC membership, take this year-end opportunity to do so now. You will not regret it, and your club and community will appreciate it too.

PAC hosted the NCRAL Convention in 2019; during the event, Al Sheidler shared the stage with Dr. Steven Spangler of the University of Iowa, whose presentation was titled 'Different Views of the Night Sky' and included a tribute to a noted local astronomer of the past.

As I finish up my third term as PAC president, I would like to thank everyone for all you do. I especially would like to thank those of you who have volunteered to assist Terry Dufek as he battles recent health issues. The willingness of all of you to help out in his time of need is impressive and much appreciated. Keep looking up.

Al Sheidler

Is it time to renew? Interested in joining?
There's a membership form on page 17.
Looking forward to hearing from you!

Astronomy can be done without a telescope

Although Galileo is well known as the first to use the new invention of the telescope for astronomy, he was not the first astronomer.

The Danish astronomer Tycho Brahe was born on December 14, 1546, so we celebrate the anniversary of his birthday this month. Tycho Brahe became interested in astronomy at the age of 13 when there was an eclipse, but the prediction was off by a day. He thought that more accurate eclipse predictions could be made if there were more accurate astronomical observations.

Three years later, he noted that the predictions of a conjunction of Jupiter and Saturn were inaccurate, and he started keeping a journal of measurements of the positions of the planets every night.

There were no telescopes for astronomy then, but Brahe was able to do astronomy measurements using an observatory and instruments he designed and built to determine the precise positions of visible stars and planets. He was able to achieve accuracy approaching one arcminute, which is one -sixtieth of a degree (out of 360 degrees).

Johannes Kepler became an assistant to Brahe and carried the observations further with the use of a telescope, and then refined the model of the Solar System as we know it today. Kepler had great respect for Brahe's methods and accuracy and considered his observations to be providing the foundation for a restoration of the science of astronomy.

It is amazing to think of all that Brahe did without a telescope. We can also look up at the sky without a telescope in mid-December and see some interesting sights in the night sky and think about what the early astronomers accomplished.

The planet Venus is the brightest object the night sky after the moon. Look low above the southwest horizon and you will easily find Venus. Venus sets soon after the sun sets, so to observe it you need to be looking up soon after sunset.

This illustration shows Tycho Brahe with some of the instruments he developed to more accurately measure the night sky, without a telescope.

Jupiter is the next brightest planet and will be obvious high in the southwest after sunset. To the right of Jupiter and lower to the horizon is the much dimmer Saturn.

These two planets were much closer to each other, in conjunction, last December, but are still relatively close to each other in the sky, because they are 10 and 15 times as far from the sun as the Earth and therefore appear to move more slowly across the sky.

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Astronomy without a telescope

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As the night progresses, Saturn and Jupiter will seem to follow Venus across the sky and later set in the west-southwest.

The most well-known asterism now is the Big Dipper. An asterism is a group of stars forming a pattern in the sky, and in this case the Big Dipper is a part of the constellation Ursa Major, the big bear.

In December, the Big Dipper is very low in the northern sky, so you will need a good view of the northern horizon to see it as it rises above the horizon with the dipper bowl first to rise. The two right-most stars point up towards Polaris, the north star, which will be about 42 degrees above the horizon. This is because the Quad Cities is located at almost 42 degrees latitude north of Earth's equator.

Because Polaris is almost exactly (to within less than one degree) above the North Pole, all other stars and objects in the sky appear to rotate around it as we are turning on the Earth below.

Polaris is also the end of the handle of the Little Dipper, which is part of Ursa Minor, the little bear. In December, it is positioned in the early evening as if it could be pouring into the Big Dipper.

Soon after sunset at this time of the year, we see the constellation Orion rising in the east, easily identified by the three stars forming his belt. Orion appears leaning to the left from our point of view, so his belt stars appear almost in a vertical row.

The bright star Betelgeuse represents his shoulder and the brighter star Rigel his leg. Below his belt, you will see three dimmer stars in a row forming what is known as his sword. The fuzzy area around the middle star of the sword is one of the most interesting objects that can be seen with the naked eye, the Orion Nebula.

This is a region of stellar debris that is condensing to form new stars, and appears as a fuzzy spot to the naked eye. It is 1,344 light years from earth and 24 light years across.

Back at the Big Dipper, look at the visible star next to the end of the handle. It is Mizar, but it also has a companion Alcor, which makes the pair a double star. It is one of a very few double stars that can be resolved without using a telescope.

Later in the evening, after Orion rises higher, you may see the bright star Sirius rise above the horizon. This is the "Dog Star," the brightest in the constellation Canis Major, and is one of the closest stars to Earth at only 8.6 light years away.

Following up from Orion's belt past a bright star, Aldebaran, and again as far, you can see up to seven stars of the Pleiades, an area of new star formation 444 light years from earth. There are many more stars in this cluster, and depending on your viewing location and surrounding light background, you may be able to see a few more.

The farthest object that can be seen without a binoculars or a telescope is the Andromeda galaxy, named for the constellation we see it in.

If you are in a dark area with little or no light pollution, look from Polaris, then look higher in the sky, past the "M" in the sky that is Cassiopeia, and continue to look almost straight up. You could see a dim fuzzy spot that is the center of the Andromeda Galaxy.

December also will have the Geminids meteor shower. With its peak predicted for early morning on December 14, looking for a Geminid meteor would be a perfect way to celebrate Tycho Brahe's birthday, as you look up into the sky and think about all he could see without a telescope.

Dale Hachtel

NCRAL convention set for May 13-14

In 2019, the Popular Astronomy Club had the honor of hosting the annual convention of the North Central Region of the Astronomical League. In those pre-pandemic times, little did we know that it would be three years before NCRAL could hold another convention.

That hiatus will (hopefully) end in 2022, as NCRAL has announced that it would hold its next convention May 13-14 at the Lakeview Conference Center in Port Washington, Wisconsin.

"Vision 2022" is the theme for the convention, repurposed from the theme that would have been used in 2020 before that event was cancelled due to the pandemic.

The 2022 NCRAL convention will feature the following lineup of speakers and presenters:

- Dr. William Dirienzo, Assistant Professor of Physics & Astronomy at the University of Wisconsin-Sheboygan
- Brandon Hamil, Minnesota Astronomical Society, whose topic will be "The Traveling Astronomer"
- Dr. Franck Marchis, Senior Planetary Astronomer at the SETI Institute and Chief Science Officer at Unistellar
- Kate Meredith, Founder and Director of Education at Geneva Lake Astrophysics and STEAM
- David Prosper, Program Manager for Amateur Astronomy at the Astronomical Society of the Pacific and Administrator of the NASA Night Sky Network
- Dr. Dennis Roscoe, Astronomy Instructor at the University of Wisconsin-Waukesha, whose topic will be "Next Generation Telescopes."
- "Astro" Bob King, retired Photo Editor of the Duluth News Tribune and publisher of the "Astro Bob" blog since 2008; contributing writer for Sky and Telescope and Universe Today, author of "The Night Sky With The Naked Eye" and "Wonders Of The Night Sky You Must See Before You Die."
- Banquet speaker: Dr. Francis Halzen, Gregory Breit Professor and Hilldale Professor at University of Wisconsin-Madison, and Principal Investigator of the IceCube Neutrino Observatory in Antarctica

Other speakers and topics may also be added and will be announced as they are confirmed.

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Texas Star Party returns this spring

Registration is now open for the 42nd annual Texas Star Party, which returns this spring following a two-year hiatus.

The Texas Star Party will be held from April 24 to May 1, 2022, at Prude Ranch in Fort Davis, in the "Big Bend" region of West Texas.

You must apply by January 5 to be entered into a random drawing for those who'd like to stay at the limited lodging facilities available at Prude Ranch. Note that you will also need to provide a negative COVID test or proof of vaccination in advance of the event in order to attend.

All application fees must be received by April 15, and you will not be allowed to enter if you have not registered in advance.

More information on the Texas Star Party is available at https://texasstarparty.org/

PAC November meeting features former member

The Popular Astronomy Club held its regular monthly meeting on November 8 at the Butterworth Center in Moline. Eight PAC members attended the meeting "live," with another 15 joining via Zoom.

The meeting featured a virtual presentation by Katie Melbourne, a former PAC member who now lives in Colorado, where she is a PhD student in aerospace engineering at the University of Colorado in Boulder and systems engineer at Ball Aerospace. Katie discussed the upcoming launch of the James Webb Space Telescope and how the telescope will be used to gather data on exoplanets and other celestial phenomena.

Katie Melbourne, a former PAC member who is a PhD candidate at the University of Colorado, makes a virtual presentation on the Webb Space Telescope.

After the presentation, some astrophotos taken by Byron Davies were shown. PAC president Alan Sheidler also discussed the upcoming election for club officers and announced the slate of candidates.

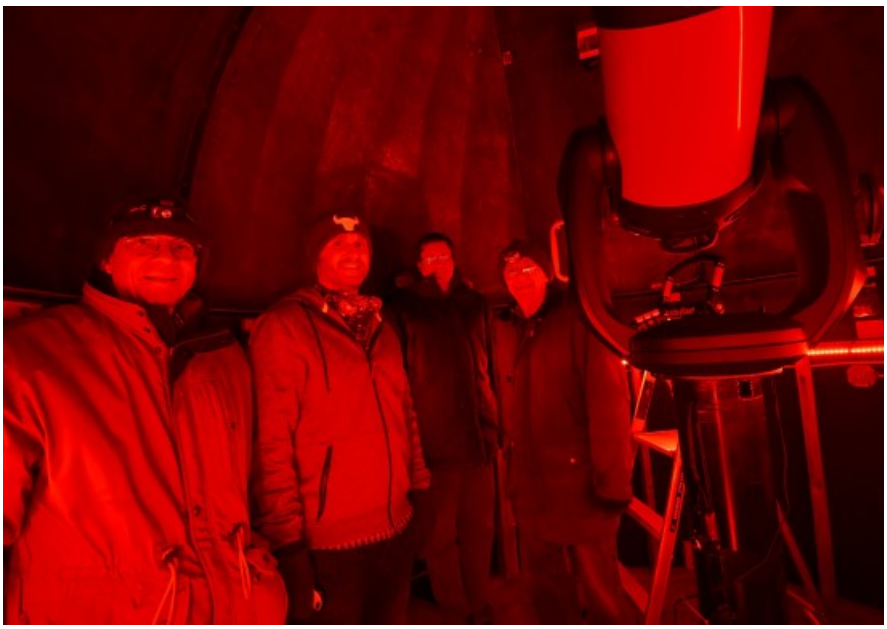
A recording of the meeting can be viewed on YouTube via this link: https://youtu.be/inXnHeFfqYg

Let it snow: PACMO winterized

A group of PAC members spent part of the Sunday after Thanksgiving by getting together to winterize the PACMO and get it ready for outside storage at Sun-Rys in Coal Valley.

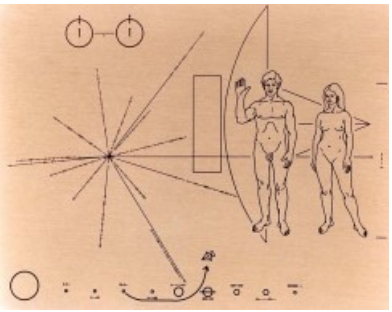
The process of winterizing the mobile observatory included removing the batteries, telescope, flat screen TV, video camera and other items vulnerable to subfreezing cold. The PACMO was then wrapped with a tarpaulin to protect the exterior from ice and snow.

Thanks to those PAC members who participated in this important annual project: Rusty Case, Dale Hachtel, Mike Haney, Jim Rutenbeck and Alan Sheidler.



This group braved the cold on November 23 and gathered at the Paul Castle Observatory for some viewing. Shown are Al Sheidler, Ian Spangenberg, Chad Potter, and Dale Hachtel. Byron Davies, Wayland Bauer and Dino Milani also set up telescopes outside. The objects seen include the Pleiades and Double Cluster, along with a transit of Jupiter by its moons Ganymede and Callisto.

ASTRONOMY AND SPACE HISTORY – IT HAPPENED IN DECEMBER



December 3, 1973: The Pioneer 10 spacecraft makes its closest approach to Jupiter, coming within 82,178 miles of the gas giant's outer atmosphere. Pioneer 10 was the first unmanned mission to the Solar System's outer planets and was deemed a complete success after returning spectacular photos of Jupiter, along with reams of useful scientific data. After flying by Jupiter and crossing the orbits of Saturn and Neptune, Pioneer 10 continued as planned into interstellar space. It carries a famous plaque intended to communicate information to any intelligent beings who may stumble upon the spacecraft.

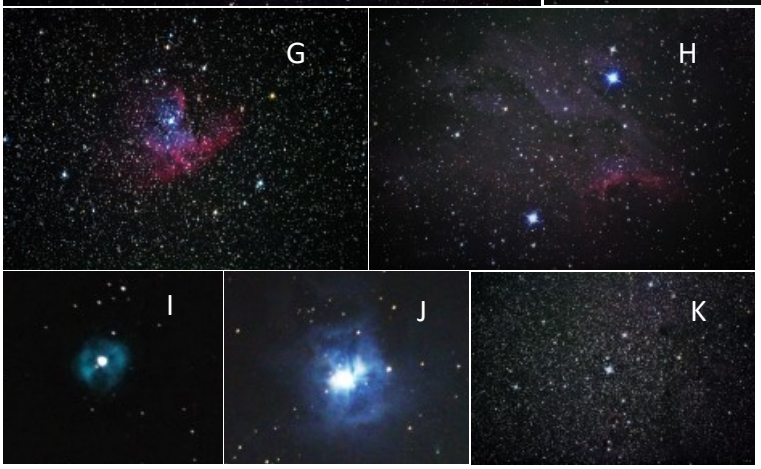
December 7, 1972: Dr. Harry Nelson, professor of mathematics and astronomy at Augustana College and past president of the Popular Astronomy Club, and his wife, Lillian, attend the launch of Apollo 17 at Cape Canaveral in Florida. Earlier in the year, a moon rock was placed on display at Augustana's Gamble Observatory, a facility built thanks to Dr. Gamble's efforts. Apollo 17 turned out to be the final mission to the moon; though other Apollo missions had been planned, all were cancelled due to budgetary constraints and other considerations.

December 17, 1969: The U.S. Air Force officially ends "Project Blue Book," the code name of a project that began in 1952 and was intended to systematically study reports of unidentified flying objects. More than 12,000 UFO reports were analyzed during Project Blue Book, which concluded that none posed a threat to national security nor represented technological developments or principles beyond current scientific knowledge. In addition, none of the UFOs sighted were categorized as extraterrestrial vehicles, and were likely either misidentifications of natural phenomena, such as clouds, or aircraft, perhaps secret reconnaissance planes such as the U-2. While Project Blue Book may be history, the Department of Defense last month announced the formation of the Airborne Object Identification and Management Synchronization Group, which will "detect, identify and attribute objects of interests in Special Use Airspace" and "assess and mitigate any associated threats to safety of flight and national security." Earlier this year, the U.S. Navy's Unidentified Aerial Phenomena (UAP) Task Force stated that some UAPs "appeared to exhibit unusual flight characteristics" and "clearly pose a safety of flight issue and may pose a challenge to U.S. national security."

December 23, 1784: The discovery of a new variable star now known as Eta Aquile is announced; the star had been found by Edward Piggott of York, England, who was studying stars that appeared to vary in magnitude. Astronomers now think that Eta Aquile is the first Cepheid variable star ever found. Cepheid variables pulsate at a regular rate and so are used as benchmarks in measuring galactic distances.

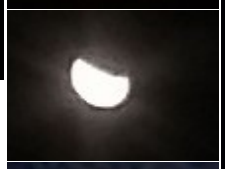
December 24, 1965: Something drops from the sky onto the village of Barnwell in England, and it's not Santa Claus' sleigh; rather, it's a meteorite that shattered in pieces as it fell, including a hot rock that landed on and damaged a new car just purchased as a holiday gift. The Barnwell meteorite is classified as the largest to ever strike in the United Kingdom, and is commemorated in a plaque located in the village near where it came down.

MEMBER OBSERVATIONS



Here's a page filled with beautiful astrophotos taken by Byron Davies and shown during the November PAC meeting. Shown are (A) Crab Nebula; (B) Rosette Nebula; (C) Bubble Nebula; (D) NGC 891; (E) California Nebula; (F) Horsehead / Flame Nebula; (G) PacMan Nebula; (H) Pelican Nebula; (I) Crystal Ball Nebula; (J) Iris Nebula; (K) Elephant's Trunk Nebula

MEMBER OBSERVATIONS
& CLUB ACTIVITIES



Here are some photos taken of the lunar eclipse during the wee hours of November 19. The photo at right was taken by Alan Sheidler and shared by several local media outlets; the photos in the middle are from Dale Hachtel and Roy Gustafson, who used his handheld iPhone; and the photo above was sent by Alvin Lavoie (friend of the editor) who took it from his home in Lansdale, Pennsylvania.

On November 2, PAC held an observing session for a group of Girl Scouts and their families at Trinity Lutheran School in Davenport. The group observed the planets Venus, Jupiter, Saturn and Neptune, viewing the moons of the latter three. The telescope was also turned to Polaris, revealing that the north star is actually a double. PAC members who participated included Alan Sheidler, Wayland Bauer, Dale Hachtel and Byron Davies.

MEMBER OBSERVATIONS
& CLUB ACTIVITIES

Rusty Case, Byron Davies, John Douglas, Dale Hachtel and Al Sheidler got together at Paul Castle Observatory on October 30 and sent in these photos of the Andromeda Galaxy, the Dumbbell Nebula and some star clusters. Both the Andromeda and Dumbbell photos are stacked images taken with 30-second exposures.

The partnership between PAC and the Moline School District remains strong, as shown in an observing session at John Deere Middle School on November 18. Telescopes were set up on school grounds and resulted in these images of Neptune, Saturn and Uranus and their moons.

The new American Doll and Toy Museum, located in Rock Island in the building that once housed the 30/31 library branch, was the site of an observing session on November 5. About a dozen members of the public turned out for the event, during which these nice photos of Jupiter, Saturn and the Moon were taken.

Here's an impressionistic-looking photo of the final public observing session at Niabi Zoo, held November 20. About 50 people turned out for the session, held under a moon that was just past full. Despite the moonlight, an image of the Ring Nebula was captured.

MEMBER OBSERVATIONS
& CLUB ACTIVITIES

The Eldridge Branch of the Scott County Library was the site of an observing session on November 1. PAC members set up waiting for the sun to go down; those present were Mike Dannenfeldt, Dale Hachtel, Byron Davies, Terry Dufek, Wayland Bauer, Mark Pershing, Al Sheidler, Mike Haney, Rusty Case, Paul Levesque and Dino Milani. While turnout from the public was light, those who came were enthused by what they saw and showed great interest. The PACMO and member telescopes provided excellent views of the planets Venus, Saturn, Jupiter, Neptune and Uranus; other targets included the double star Albireo, globular clusters such as M2 and M15, and planetary nebulae M27 (The Dumbbell) and M57 (The Ring Nebula).

Astronomical League Observing Programs

The Astronomical League offers more than 70 different observing programs, ranging alphabetically from “Active Galactic Nuclei” to “Youth Astronomer. “ The programs are designed to provide goals and directions for your observations and cover a full range of observable objects and skill and experience levels.

You can earns certificates and pins for completing the programs. Here’s a link to find out more:
https://www.astroleague.org/observing.html

December 2021

Daffy Duck

Agreed, this seems like an awfully daffy title for an astronomy article. But there is method to the madness, and there is a story.

During the late summer of 2019, there was a star party in southeast Arizona that featured a dark sky and five perfect back-to-back nights. As I spent hour after hour hunting for comets, I came across the sprawling North America Nebula in the northern sky constellation of Cygnus the swan. But, this time, something different appeared.

It was a strange structure, the outline of a dark nebula bordered by a slightly brighter cloud. The whole feature was rather subtle, so that sometimes it was there, and then it faded so that sometimes it wasn't.

I spent some time trying to determine a name for it. It looked like the head of a duck. I couldn't call it the wild duck nebula, as there is a cluster with that name. And Donald Duck is a bit confusing. So how about calling it the Daffy Duck nebula?

Thus, the structure is named after Daffy Duck. It is No. 403 in my catalog of interesting things found during my more than 56 years of comet hunting.

I believe it is a small dark construction at the northern tip of the North America Nebula, about where Hudson Bay is not accurately located. It could have been where the Gulf of Mexico is, but that area is virtually impossible to spot visually, even under a dark sky.

Like the Horsehead Nebula in Orion, it is very difficult to spot and it is best viewed only in a photograph. The accompanying picture shows it at its top, a little to the left of center. The accompanying photograph was taken using the Hubble Space Telescope.

There are more than four hundred other celestial objects that have come my way over the years. Beginning with NGC 1931, which I spotted in January 1966, many of these are already well-known deep sky objects. But a few are interesting groupings of stars, called asterisms, that no one has pointed out before. One of my favorites is a structure of faint stars I call "Wendee's Ring."

These always-welcome objects in the sky are fun to observe and enhance my enjoyment of my hours under the stars. When I can see Daffy Duck, it reminds me of the happy hours I spent as a child at Beaver Lake, an artificial pond located near the top of Mount Royal in Montreal, that hosts dozens of mallard ducks.

On clear, moonless nights now, I offer a cosmic hello to Daffy Duck and the many objects in the night sky I have come to treasure as good friends.

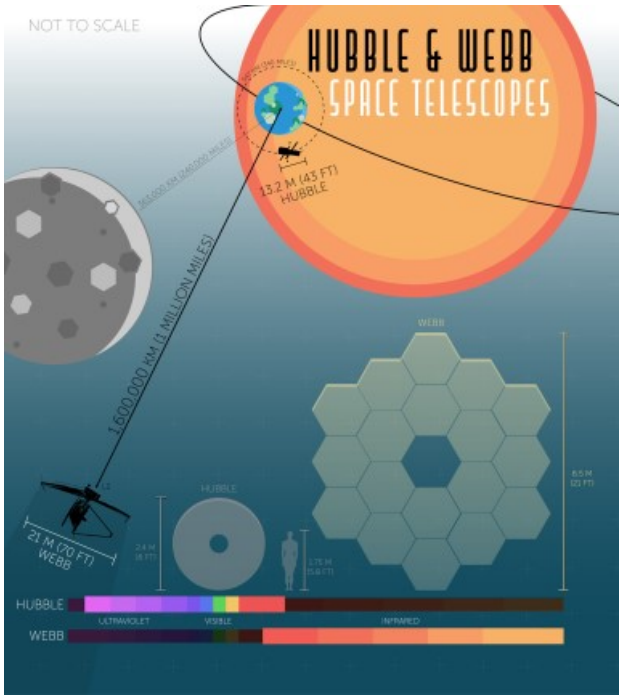
The Daffy Duck nebula—a dark area located at the tip of the North America Nebula—is shown in this photo from the Hubble Space Telescope.

Webb Telescope ready to launch (almost)

NASA's James Webb Space Telescope is ready for lift-off! As of this writing (November 15), the much-anticipated next-generation space telescope is being carefully prepared for launch on December 18 *(NOTE: The launch is now delayed until at least December 22*) and will begin its mission to investigate some of the deepest mysteries of our universe.

The development of the Webb Telescope began earlier than you might expect – the concept that would develop into Webb was proposed even before the launch of the Hubble Space Telescope in the late 1980s. Since then, its design underwent many refinements, and the telescope experienced a series of delays during construction and testing.

While frustrating, the team needs to ensure that this extremely complex and advanced scientific instrument is successfully launched and deployed. The Webb team can't take any chances; unlike the Hubble, orbiting at an astronaut-serviceable 340 miles above Earth, the Webb will orbit about 1 million miles away at Lagrange Point 2. Lagrange Points are special positions where the gravitational influence between two different bodies, like the Sun and Earth, "balance out," allowing objects like space telescopes to be placed into stable long-term orbits, requiring only minor adjustments – saving Webb a good deal of fuel.



The Webb Space Telescope will have a mirror much larger than that of the Hubble Space Telescope and will also orbit much further from Earth.

Since this position is also several times further than the Moon, Webb's sunshield will safely cover the Moon, Earth and Sun, and block any potential interference from their infrared radiation. Even the seemingly small amount of heat from the surfaces of the Earth and Moon would interfere with Webb's extraordinarily sensitive infrared observations of our universe if left

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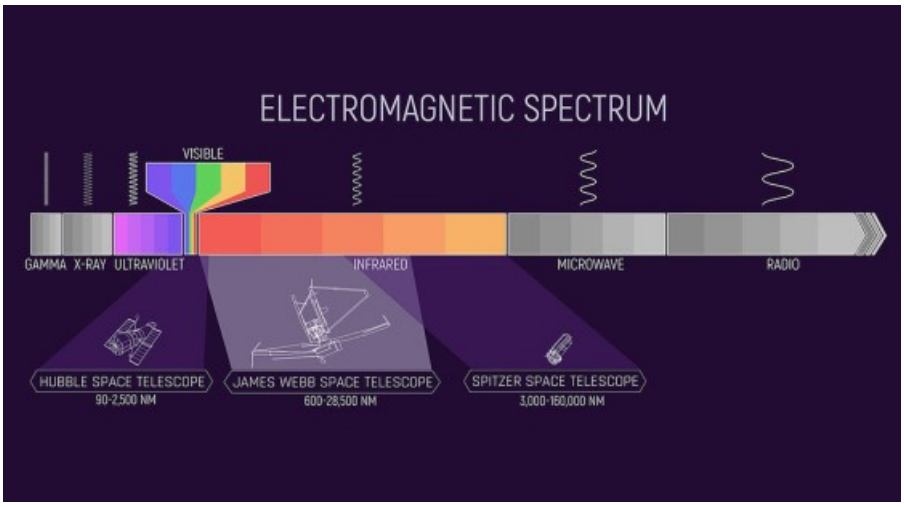

The Webb Space Telescope will observe a wide range of the electromagnetic spectrum, including portions studied by the Hubble and Spitzer space telescopes.

Webb Space Telescope

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unblocked. More detailed information about Webb's orbit can be found at bit.ly/webborbitinfo, and a video showing its movement is at bit.ly/webborbitvideo.

Once in its final position, its sunshield and mirror fully deployed and instruments checked out, Webb will begin observing! Webb's 21-foot segmented mirror will be trained on targets as fine and varied as planets, moons, and distant objects in our outer Solar System, active centers of galaxies, and some of the most distant stars and galaxies in our universe: objects that may be some of the first luminous objects formed after the Big Bang! Webb will join with other observatories to study black holes - including the one lurking in the center of our galaxy, and will study solar systems around other stars, including planetary atmospheres, to investigate their potential for hosting life.

Wondering how Webb's infrared observations can reveal what visible light cannot? The "Universe in a Different Light" Night Sky Network activity can help - find it at bit.ly/different-light-nsn. Find the latest news from NASA and Webb team as it begins its mission by following #UnfoldTheUniverse on social media, and on the web at nasa.gov/webb.

David Prosper

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

This is a corrected version of the hand measurements chart published in last month's Night Sky Network article.

NCRAL convention

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Activities on Friday the 13th will include a "Library Telescope" workshop and a tour of the Jim and Gwen Plunkett Observatory at nearby Harrington Beach State Park.

The cost to register for the convention is $130, a price that includes all speakers, presentations and activities and catered meals for both lunch and dinner on Saturday. Here is the link to register online: https://ncsf.info/ncral-vision-2022/ncral-vision-2022-online-registration

If you'd rather register by mail, download this form: https://ncsfastronomy.files. wordpress.com/2021/11/ncral-2022-mail-in-registration-v1.pdf

A block of rooms has been set aside for the convention at the Country Inn and Suites, the hotel which hosts the conference center. Rooms are available at the discounted rate of $113 per night plus tax, double occupancy, with $10 per night for additional guests. The hotel features an indoor pool, whirlpool, fitness center and game room, and serves a hot breakfast buffet every morning.

To reserve a room, call the Country Inn and Suites at (262) 284-2100 or visit their website at: https://www.radissonhotelsamericas. com/en-us/hotels/country-inn-port-washington-wi

Port Washington is located on Lake Michigan north of Milwaukee, right off Interstate 43.

If you have questions or need more information, send an email to: astrosetz@hotmail.com. You can also visit the convention website for information and updates, at: https://ncsf.info/ncral-vision-2022/

UPCOMING EVENTS

Date December 13, 2021

Event: Regular Meeting @ 7 p.m.

- **Location: Zoom / Butterworth Center**
- **Program : The Year in Review**
- **Presented by Roy Gustafson**

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
JAN 2022	AVAILABLE	AVAILABLE	January 10 - Presentation: "Curiosity Paving the Way for Perseverance" by Dr. Rebecca M E. Williams, Planetary Science Institute
FEB 2022	Wayland Bauer	AVAILABLE	February 14 - Presentation: "Seeing Stars: How Birds Use the Night Sky During Migration" by Dr. Jennifer C. Owen, Corey Marsh Ecological Research Center, Michigan State University
MAR 2022	AVAILABLE	AVAILABLE	March 14 - Business Meeting; Smorgasbord of Member Presentations
APR 2022	AVAILABLE	AVAILABLE	April 11 - Presentation: "Fantastic Space Discoveries: Theories of Solar System Formation" by Jim Kovac, Chicago Society for Space Studies
MAY 2022	AVAILABLE	AVAILABLE	May 9 - Presentation: "Technology for the Astronomical Community & More" by Matt Dieterich, Technical Services Manager, PlaneWave Instruments, Inc., Adrian, Michigan
JUNE 2022	AVAILABLE	AVAILABLE	June 13 - Presentation: "Sky With Ocean Joined: Scaling the Stars at the U.S. Naval Observatory, 1830 to the Present" by Geoff Chester, Public Affairs Officer, U.S. Naval Observatory, Washington D.C.
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

December 12: Solar observing at Felix Adler Children's' Museum, Clinton, Iowa, 1 to 4 p.m.

December 12-19: Christmas Star program at the Donald Schaefer Planetarium, Bettendorf High School; more information at https://bhs.bettendorf.k12.ia.us/our-school/news-and-blog/2021/11/bhs-christmas-star-program-dec-12-19

OTHER UPCOMING EVENTS IN 2022:

- **NIABI PUBLIC VIEWING:** Third Saturday of the month, beginning March 19 through November 19
- **May 13-14:** NCRAL Convention, Port Washington, Wisconsin *(see page 6)*
- **August 13:** Annual PAC Picnic *(no regular meeting)*
- **September 23-24:** Eastern Iowa Star Party
- **October 22:** Annual PAC Banquet

DATES AND EVENTS ARE TENTATIVE AND SUBJECT TO CHANGE

POPULAR ASTRONOMY CLUB

Thank you for your interest in the Popular Astronomy Club. To renew your membership or to apply as a new member, please fill in the information and either mail this form to the address below, or bring it to a PAC event. The membership year runs from October 1st through September 30th. There is a pro-rated amount if you join anytime during the year (see below). Our club newsletter, REFLECTIONS, will be e-mailed to you and it will be posted on the club website.

Submission of this application and payment confirms the applicant's agreement to abide by the policies and procedures detailed in the PAC Policy & Procedures Document available at our website: www.popularastronomyclub.org.

Membership pro-rated (for new members) amount by month:
Oct-$30.00, Nov-$27.50, Dec-$25.00, Jan-$22.50, Feb-$20.00, Mar-$17.50, Apr-$15.00, May-$12.50, Jun-$10.00, Jul-$7.50, Aug-$5.00, Sep-$2.50

PAC renew or new member:

(a) Regular Membership	$30.00	$_____
(b) Additional family member ($7.50 each) x (#) _____		$_____

Or you can elect c, d, or e (this includes the $30.00 membership, with the balance a tax deductible gift to PAC):

(c) Supporting Member	$40.00	$_____
(d) Sustaining Member	$60.00	$_____
(e) Patron Member	$80.00	$_____
(f) Student Member	$10.00	$_____
	Grand Total	$_____

Your Name: _____

Address: _____

City _____ State _____ Zip _____

E-Mail _____

Home Phone: _____ Cell Phone _____

Please enter name (s) of ADDITIONAL FAMILY MEMBERS:

_____ _____ _____ _____

Emergency Contact: _____ phone # _____

THANK YOU!! Welcome to the Popular Astronomy Club!!

Make your check payable to the **Popular Astronomy Club, Inc.** Mail or present at a PAC meeting to:

Dale Hachtel (treasurer)
1617 Elm Shore Drive
Port Byron, Illinois 61275
cell # 614-935-5748