



# Reflections

The Newsletter of the Popular Astronomy Club

ESTABLISHED 1936



April 2021

## President's Corner: April 2021



Alan Sheidler

Welcome to the April 2021 edition of "Reflections." As I write this, the pandemic is continuing to abate and things are beginning to return to normalcy. Many of us have been vaccinated

and are looking forward to reengaging the public at club observing sessions.

Our first planned public observing event is the April 17 Niabi Zoo observing session. Hopefully, the weather will cooperate and allow us to set up scopes in the zoo's parking lot. It seems like a long time ago now, but the last Niabi observing session was November 16, 2019. It will be nice to resume public observing sessions.

For this next Niabi session, we plan to use video screens so that visitors can more easily socially distance and view objects in a group session without having to touch the equipment. Club members are also urged to use masks and socially distance.

I suspect 2021 may be a busy year for public outreach. The Putnam Museum has requested our involvement in their "Gateway To Space" weekend (daytime) event on June 12 & 13. Giant Goose Recreation Area, Atkinson, Illinois, has also requested us to be there for solar observing on June 5.

We have also been contacted by the Davenport Eastern Branch Library about having an observing session there this spring. Stay tuned as we solidify plans for these events.

On another front, PAC was contacted by Chad Potter from John Deere Middle School to rehabilitate the school's 8-inch LX200 telescope. We were successful in getting the scope operational and used it at our first club observing session of the season at the Paul Castle Observatory on March 20.

The school intends to purchase additional telescopes and host observing sessions next school year. Mr. Potter has invited the Popular Astronomy Club to participate in these observing sessions and to help develop an astronomy program for the school. I would like to applaud Mr. Potter's enthusiasm and welcome the school's support for developing a program relating to the science of astronomy.

I have a feeling public interest will intensify in the coming months and that there will be additional requests for PAC's involvement. I would like to invite PAC members to be involved in these opportunities.

I am reminded by our observatory director, Rusty Case, we need to get the PACMO mobile observatory out of winter storage and ready for this year's public observing sessions. If you would like to be trained as a telescope operator, please let Rusty or I know and we will provide training. The PACMO's 12" LX200 is a large telescope with formidable capabilities. We also have an astronomical video camera and flat screen monitor in the PACMO.

I would encourage folks to be involved and learn the use of this equipment. Not only is this a learning opportunity, it is "highly cool." In any event, we always need volunteers to assist in our public observing sessions.

In the meantime, please enjoy this month's newsletter and keep looking up!



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## PAC HISTORY THROUGH 2000 POSTED ONLINE

A history of the Popular Astronomy Club that was compiled in 2000 has been posted online and can be viewed and downloaded from the PAC website (*link below*).

The history was written by Paul R. Castle, who was then president of the club, and covers all PAC activities from 1936 through the most recent turn of the century.

In his introduction to the 51-page history, Castle wrote, "Sixty-four years is just a cosmic blink, but to the members of PAC it is a blink we do not want to be forgotten." Another 21 years have passed since the history was written, bringing the club to its 85th anniversary.

Some club members are currently trying to update to the history, and are using past issues of "Reflections" as a primary source. That's why you are encouraged to submit updates on your club activities to the newsletter; if you do, maybe you'll go down in history!

Send your newsletter submissions to interim editor Paul Levesque, at [levesque5562@att.net](mailto:levesque5562@att.net).

**Paul Levesque**

CLICKING ON THIS  
IMAGE WILL TAKE  
YOU TO THE PAC  
HISTORY THROUGH  
2000; THE IMAGE IS  
USED ELSEWHERE TO  
SHOW INTERNET LINKS



## 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 of 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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# Catch some rare alignments of the Jovian moons

## *Callisto, Europa, Ganymede and Io moving in harmony this spring*

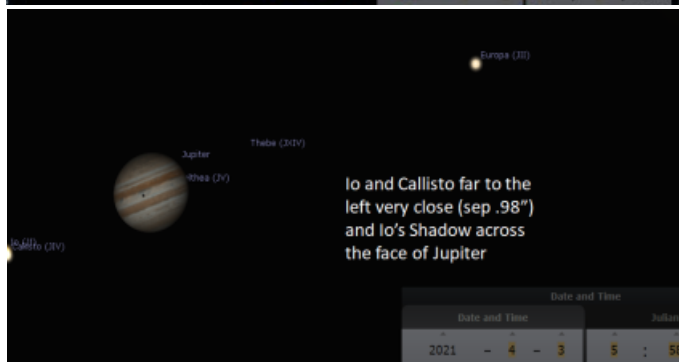
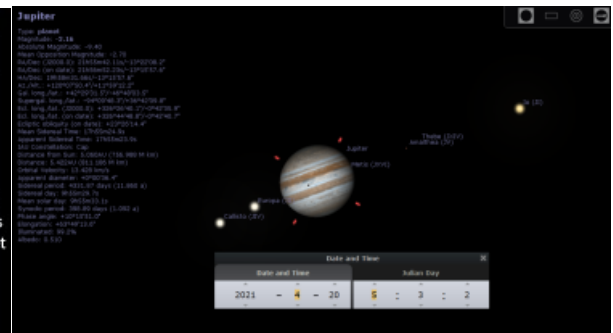
As Jupiter orbits the Sun every 11.86 years, it reaches a point in which the orbits of the Galilean moons are tilted in a single horizontal row as viewed from Earth. Callisto, Europa, Ganymede and Io move from left to right, and may have one moon eclipsing another or some spectacular near misses.

The reason for this is that a Jovian equinox (so to speak) is happening, a celestial event that occurs about every six years. The last series of these events occurred in 2015

and the next occurs this year, between January and August.

Reviewing some of the views through Stellarium and the chart on page reveals some of those from our location. Most are near misses or come at a time when Jupiter is in full daylight or hasn't risen yet. Still, there are times for some spectacular photographic and viewing opportunities, so pick your date and time to view yours!

**Terry Dufek**



## MUTUAL EVENTS OF THE GALILEAN SATELLITES IN 2021

Date	Start Time* CDT	Moon 1	Event	Moon 2	Dimming (mag.)	Duration	Sunset	Sunrise
31-Mar	10:38 AM	Ganymede	eclipses	Europa	0.47	8 min.	6:07pm	7:12 AM
1-Apr	8:18 AM	Ganymede	occults	Io	0.57	5 min.	6:07pm	7:11 AM
2-Apr	5:38 PM	Europa	eclipses	Io	0.38	5 min.	6:06pm	7:10 AM
3-Apr	8:01 PM	Callisto	eclipses	Europa	0.4	7 min.	6:06pm	7:09 AM
4-Apr	12:26 AM	Io	eclipses	Europa	0.51	5 min.	6:06pm	7:08 AM
5-Apr	10:20 AM	Io	occults	Ganymede	0.34	7 min.	6:05pm	7:07 AM
6-Apr	6:46 AM	Europa	eclipses	Io	0.33	5 min.	6:05pm	7:06 AM
7-Apr	1:33 PM	Io	eclipses	Europa	0.58	5 min.	6:05pm	7:05 AM
8-Apr	1:52 AM	Ganymede	eclipses	Europa	0.47	8 min.	6:05pm	7:04 AM
8-Apr	11:13 AM	Ganymede	occults	Io	0.37	5 min.	6:05pm	7:04 AM
11-Apr	2:39 AM	Io	eclipses	Europa	0.63	5 min.	6:04pm	7:01 AM
11-Apr	5:01 AM	Io	eclipses	Callisto	0.43	11 min.	6:04pm	7:01 AM
11-Apr	11:17 PM	Io	eclipses	Callisto	0.48	26 min.	6:04pm	7:01 AM
12-Apr	6:51 AM	Io	eclipses	Callisto	0.48	22 min.	6:04pm	7:00 AM
14-Apr	3:46 PM	Io	eclipses	Europa	0.63	5 min.	6:03 PM	6:58 AM
15-Apr	5:08 AM	Ganymede	eclipses	Europa	0.47	9 min.	6:03 PM	6:57 AM
18-Apr	4:52 AM	Io	eclipses	Europa	0.63	5 min.	6:02pm	6:54 AM
19-Apr	10:05 AM	Callisto	eclipses	Io	0.42	45 min.	6:02pm	6:53 AM
19-Apr	12:50 PM	Callisto	eclipses	Io	0.45	48 min.	6:02pm	6:53 AM
19-Apr	1:32 PM	Callisto	eclipses	Ganymede	1.39	14 min.	6:02pm	6:53 AM
20-Apr	10:50 AM	Callisto	eclipses	Io	1.11	10 min.	6:02pm	6:52 AM
20-Apr	1:03 PM	Callisto	eclipses	Europa	0.36	38 min.	6:02pm	6:52 AM
21-Apr	5:59 PM	Io	eclipses	Europa	0.63	5 min.	6:02pm	6:51 AM
22-Apr	8:23 AM	Ganymede	eclipse	Europa	0.47	9 min.	6:01pm	6:50 AM
22-Apr	2:16 PM	Ganymede	eclipses	Io	0.32	6 min.	6:01pm	6:50 AM
25-Apr	7:06 PM	Io	eclipses	Europa	0.63	5 min.	6:01pm	6:48 AM
26-Apr	4:23 PM	Io	eclipses	Ganymede	0.36	7 min.	6:01pm	6:47 AM
28-Apr	1:57 PM	Io	eclipses	Callisto	0.33	7 min.	6:00pm	6:45 AM
28-Apr	8:13 PM	Io	eclipses	Europa	0.63	5 min.	6:00pm	6:45 AM
29-Apr	7:13 PM	Ganymede	eclipses	Callisto	0.35	14 min.	6:00pm	6:45 AM
29-Apr	11:40 AM	Ganymede	eclipses	Europa	0.47	8 min.	6:00pm	6:45 AM
29-Apr	5:03 PM	Ganymede	eclipses	Io	0.5	7 min.	6:00pm	6:45 AM
2-May	9:20 AM	Io	eclipses	Europa	0.63	5 min.	6:00 PM	6:43 AM
4-May	12:50 AM	Europa	eclipses	Ganymede	0.39	8 min.	6:00 PM	6:42 AM
5-May	10:27 PM	Io	eclipses	Europa	0.63	5 min.	6:00 PM	6:40 AM
6-May	2:58 PM	Ganymede	eclipses	Europa	0.35	8 min.	6:00 PM	6:39 AM
7-May	7:51 AM	Ganymede	eclipses	Io	0.57	8 min.	6:00 PM	6:39 AM
9-May	11:34 AM	Io	eclipses	Europa	0.63	5 min.	5:49pm	6:37 AM
11-May	4:06 AM	Europa	eclipses	Ganymede	0.75	9 min.	5:49pm	6:36 AM
13-May	12:41 AM	Io	eclipses	Europa	0.61	5 min.	5:49pm	6:35 AM
13-May	10:44 PM	Ganymede	eclipses	Io	0.57	9 min.	5:49pm	6:35 AM
16-May	1:48 PM	Io	eclipses	Europa	0.55	5 min.	5:49pm	6:34 AM
18-May	12:40 AM	Io	eclipses	Ganymede	0.98	7 min.	6:00 PM	6:33 AM
18-May	7:21 PM	Europa	eclipses	Ganymede	1.15	9 min.	6:00 PM	6:33 AM
20-May	2:56 AM	Io	eclipses	Europa	0.49	5 min.	6:00 PM	6:32 AM
21-May	1:42 AM	Ganymede	eclipses	Io	0.57	10 min.	6:00 PM	6:31 AM
23-May	4:04 PM	Io	eclipses	Europa	0.42	5 min.	6:00 PM	6:31 AM
24-May	9:14 AM	Callisto	eclipses	Ganymede	0.91	13 m	6:00 PM	6:30 AM



# Astronomy is for everyone

## ***Braille book enables the visually impaired to ‘Touch the Stars’***

Astronomy is the oldest science known to man. We have used our power of visual observation to study the heavens. Astronomy has always been a dominant force in the history of man, from the time of the Babylonians until now. For the Babylonians, studying the stars was an act of divine worship. Even the king would ask for guidance in the affairs of the state from the astronomer-priest, who searched out the will of the gods by observing the intricacies of the heavens.

Both astrology and astronomy began as observational sciences. Later, they parted company – astrology becoming associated with mysticism and astronomy with science. Astronomy measured things like the sizes and distances of the stars, their chemical composition, their motions across the sky, and the origin of the universe.

Astrology and astronomy flourished in ancient Greece, developing alongside a mythological world view that was based on

geometrical and mathematical relationships. Science began with the Greeks applying mathematics to the study of the heavens. Aristarchus in the third century B.C. calculated the distances to the Sun and the Moon. He was the first person that believed the Sun, not the Earth, was the center of the solar system, an idea that was lost and not “discovered” again until Copernicus 1,800 years later!

The ancient Egyptians developed surveying to a high degree. This led them to align the pyramids to the cardinal points with such a high degree of accuracy they are only off by 1/12th of a degree! Some believe this error is due more to “continental drift” than an error of measurement! This high degree of precision allowed them to align an inclined shaft in the Great Pyramid to the star Thuban, the north star at that time.

About 4,500 years ago, the Wessex people in southern England were moving large stones across the Salisbury plain to build an observatory – Stonehenge. This observatory aligned stones to predict the equinoxes, solstices, and other events important to these plains people. But one of the most remarkable predictions of the stone alignment was the ability to predict eclipses!

The Chinese were keeping highly accurate astronomical records and, by 2000 B.C., had determined the length of the year to be 365 days. They also observed and recorded a supernova in the constellation of Cancer in 1054 A.D.

Let’s fast-forward to the future and the use of our telescopes – ground-based and space-based. The spectacular photographs of the universe are breathtaking. The struc-

***Continued on page 6***



***Kent Cullers, a blind astronomer, wrote the foreword to ‘Touch the Stars.’***

# Touch the Stars

*Continued from page 5*

ture, the color, the magnificence is utterly awe-inspiring. But what if you can't see them? What if you are blind; is the universe closed to you? All through this article, I have talked about the sights and discoveries persons gifted with sight have made, but what about those that are not so fortunate to be able to see?

The National Braille Press has issued the fifth edition of Touch the Stars. This book was written by Noreen Grice with tactile illustrations by Irma Goldberg and Shirley Keller. The foreword of this book was written by Kent Cullers, the retired director of Research & Development at the SETI Institute.

Kent Cullers is the world's first totally blind astronomer. All the pages of this book are tactile, and the representations of various concepts are easily readable by a blind person running their fingers over the raised dots on the pages. The sightless person feels the raised dots, and then reads the explanation on the corresponding page in Braille.

This book is 103 pages long and includes 16 touchable illustrations covering constellations, planets, moon phases, total solar and lunar eclipses, galaxies, nebulae, number of planets in the Solar System and their relative positions from the Sun, and their

their relative sizes in relation to the Sun.

Jupiter and its Red Spot are portrayed along with the position of the Red Spot on the planet. Saturn and its rings are shown and explained, and the motion of the planets is displayed. Comets are explained, along with their composition. Meteors and meteor showers are displayed and explained. The Milky Way and globular star clusters are shown.

The book ends with a brief history of astronomy. For those of us who can't read Braille, there is an included pamphlet.

Touch the Stars is a textbook on astronomy for the sightless. There are more books available, and with the help of books like this and others, sightless individuals can understand the beauty of the universe.

There are other means of exploration open to the sightless. I have an app (Eclipse Soundscapes) that uses sound and vibration on an iPhone to allow an individual to feel a total solar eclipse, a galaxy, the Red Spot, and other astronomical phenomena.

Today, astronomy is not limited to those with sight but is available to all. Individuals without sight have so much to offer, and I am glad we are giving them a chance to shine.

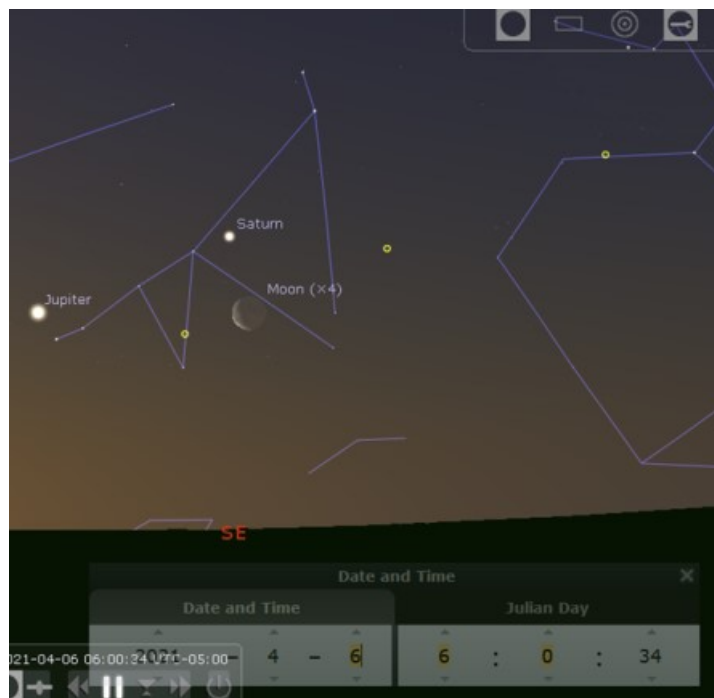
**Roy E. Gustafson**



*To celebrate the end of a long, cold winter, an observing session was held at Paul Castle Observatory on March 20. Shown are Gary Nordick, Chad Potter (guest), Byron Davies, Al Sheidler and Rusty Case; Chris and Ally Nordick were also there. After grilling steaks and brats, Rusty set up his 11-inch scope with an R2 camera and video screen; Byron set up his 8-inch reflector; and Al set up his 10-inch LX200 using a new X-Wedge to figure out how to do a polar alignment. During the session, John Deere Middle School's 8-inch LX200 was also tested.*

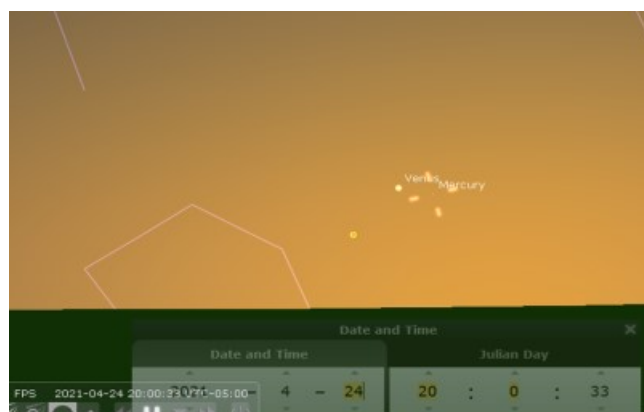
# The Planets in April 2021

The beginning of the month has Jupiter and Saturn making a lovely pair low in the southeastern sky at 6 am. The 18.9-day old moon lies almost due south. Jupiter is mag -2.05 while Saturn is mag .75. A very thin crescent moon passes to the south of Jupiter on the 6<sup>th</sup> by 50'.



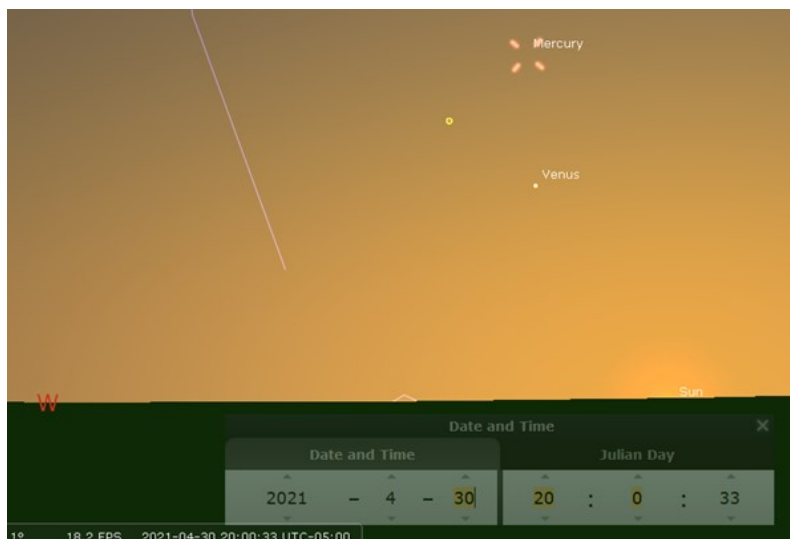
On April 13 at 8 p.m., you catch Venus just beginning to peek over the western horizon. At mag. -3.92 it is very bright though exceptionally low on the horizon. A 1.7-day old moon can be found above the horizon on this date and time. It would make a magnificent combination with Venus to photograph.

On the 24<sup>th</sup> at 8:00 pm, a change of positioning occurs when Mercury at mag -1.69 rises above the western/ northwest horizon to get extremely near Venus and separates the two by 13'. This is the best and easiest time to see the pair together for a while.

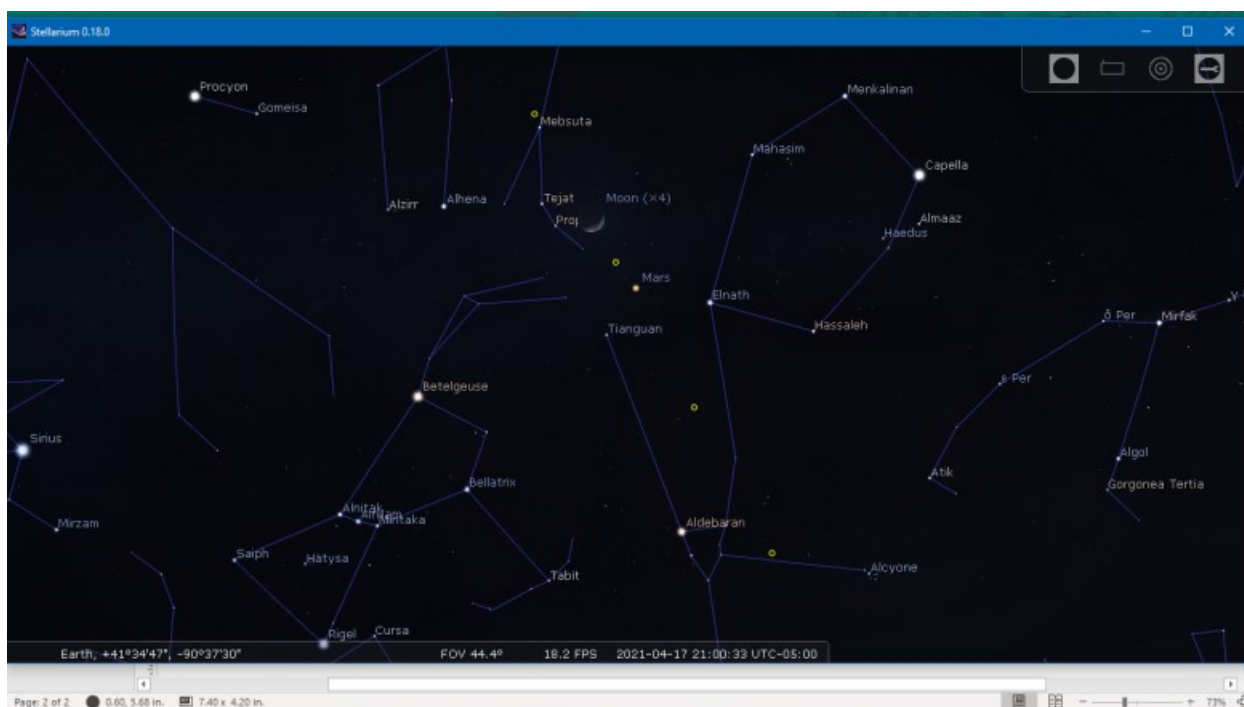


# The Planets in April 2021

Mercury continues to gain altitude throughout the month. By the 30th, it is  $4^{\circ} 33'$  above Venus and  $11^{\circ}$  above the horizon.



On April 17, the moon 5.3 days old and is  $5^{\circ}$  northeast of a slowly dimming Mars. They are both north of the constellation Orion. Mars is magnitude 1.46.



## ASTRO-TRIVIA QUESTION

*Astronomers have discovered 27 moons revolving around this planet; most of the moons are named after literary characters in William Shakespeare's plays and works by Alexander Pope. Which planet is it? Answer on page 17*



# ASTRONOMY AND SPACE HISTORY – IT HAPPENED IN APRIL



**April 7, 1959:** NASA announces the names of seven astronauts selected to fly spacecraft for Project Mercury: Scott Carpenter, Gordon Cooper, John

Glenn, Gus Grissom, Wally Schirra, Deke Slayton and Alan Shepard. All would eventually fly in space, though Slayton had to wait until 1975's Apollo-Soyuz mission.

**April 12, 1961:** Cosmonaut Yuri Gagarin of the Soviet Union becomes the first person to travel in space by completing one orbit of Earth aboard the Vostok 1 spacecraft. Immediately proclaimed a hero, Gagarin remained in the cosmonaut program but was banned from further



spaceflight following the fatal crash of Soyuz 1 (see *below*), for which he was the backup cosmonaut, because Soviet officials feared for his life. On March 27, 1968, Gagarin was killed when a MiG training jet he was piloting crashed; he was 34 years old.

**April 13, 1970:** “Houston, we’ve had a problem here.” Astronaut Jack Swigert spoke those famous words about 56 hours into the flight of Apollo 13, after an oxygen tank aboard the spacecraft’s command module ruptured and exploded. As the world watched, Swigert and fellow astronauts Jim Lovell and Fred Haise huddled inside the lunar module as Apollo 13 swung around the moon – never landing as intended – and then back toward Earth. The astronauts went back into the command module for a safe splashdown on April 17.

**April 24, 1967:** Cosmonaut Vladimir Komarov dies after his Soyuz 1 space capsule crashes and burns when its parachutes fail to deploy upon return to Earth. Komarov was the first person killed during spaceflight; his death came just three months after three American astronauts died in a fire during ground testing for the Apollo 1 mission.

**April 24, 1990:** The Hubble Space Telescope is launched aboard the Space Shuttle Discovery. Despite initial problems with its mirror, the Hubble has yielded a great volume of data and made a number of significant discoveries. Some Hubble projects were proposed by amateur astronomers. Though it went into “safe mode” last month, the Hubble should return to service soon and could remain in operation through the end of the decade.



**April 24, 2017:** Traveling aboard the International Space Station, Peggy Whitson breaks the record for most cumulative days spent in space by any NASA astronaut, at more than 534. That June, Whitson sets the record for the longest single space flight by a woman. The 57-year-old Whitson also became the oldest female astronaut ever; in addition, she’s completed more space walks than any other woman and is the oldest female spacewalker.

**April 26, 1920:** The “Great Debate” between astronomers is held at the Smithsonian Museum of Natural History in Washington, D.C. The subject of the debate was the nature of spiral nebulae and the size of the universe. Harlow Shapley contended that the nebulae were relatively small and lay within the outskirts of the Milky Way – making our home galaxy the only one in the universe – while Heber Curtis held that the nebulae were very large, and very distant, separate galaxies. Within five years, Curtis was



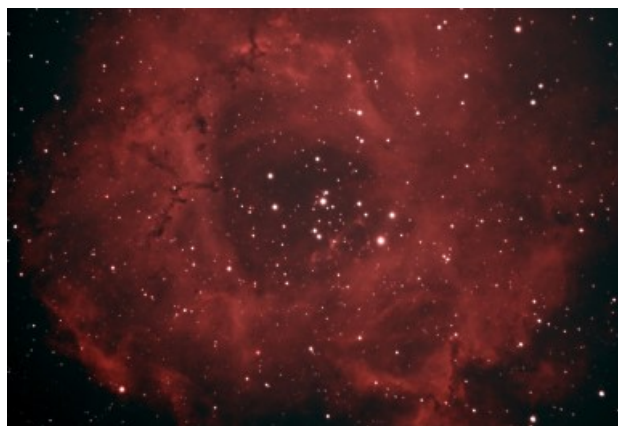
proven correct when Edwin Hubble showed that the large nebula in Andromeda was indeed a separate galaxy more than 2.5 million light-years from Earth.

**April 27, 4977 BCE:** The date the universe was created, according to noted astronomer Johannes Kepler. Coincidentally (or not), April 27 also happened to be the date of Kepler’s wedding anniversary. While we now know that Kepler’s start date for the universe was wildly inaccurate, his groundbreaking work on planetary orbits helped lead to the discovery that the universe, in fact, is nearly 14 billion years old.

# MEMBER OBSERVATIONS

## ***THE ROSETTE NEBULA***

### **THREE MEMBERS, THREE IMAGES**



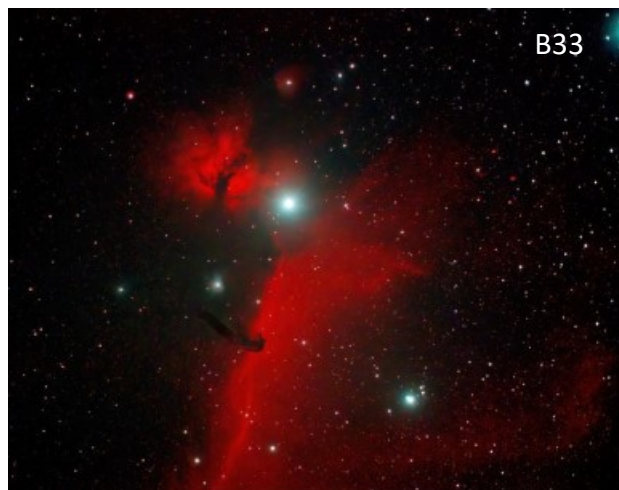
*These photos of the Rosette Nebula were taken in March by PAC members Paul Saeger (left ,photo) and Ken Boquist. Paul reports that he took his photo using an Optolong L-Enhance filter - a dual narrowband filter for HA and O3 bands - with a ZWO 294 MC Pro at gain 120. He took 20 5 minute subs and stacked using Astro Pixel processor. Ken's photo was one in a series taken from his backyard (more below and page 11) and was taken as a 12 minute exposure with an 80mm refractor . Byron's photo shows the NG 2244 open star cluster within the nebula; see page 12 for details on how it was taken.*

### ***MORE PHOTOS BY KEN BOQUIST: HOW THEY WERE TAKEN***

The images were taken with Terry Dufek's ZWO ASI 294 MC camera. Terry was kind enough to let me borrow his camera. All of the images are of HII emission nebulae and were shot using an Optolong L-enHance filter from my backyard in Rock Island.

**B33** – Horsehead Nebula: 10 minute exposure with an 80mm refractor. We see the Horsehead only because it is silhouetted by the bright background nebula IC 434. Also visible from the left of the brightest star is NGC 2024, the Flame Nebula.

*Continued on page 11*





# MEMBER OBSERVATIONS

## ***MORE PHOTOS BY KEN BOQUIST: HOW THEY WERE TAKEN***

*Continued from page 10*

**IC 405** – Flaming Star Nebula: 10 minute exposure with a 5.1 inch refractor.

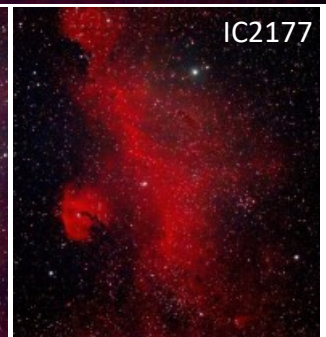
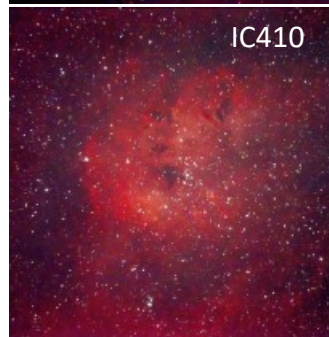
**IC 410**: 8-minute exposure with a 5.1 inch refractor. Really deep exposures will show two objects called the “Tadpoles,” but they are not really visible in this image.

**IC 2177** – Seagull Nebula: 8 minute exposure with an 80mm refractor.

**Sh2-217**: 10 minute exposure with a 5.1 inch refractor. There is no name for this object that I’m aware of.

**Sh2-219**: 10 minute exposure with a 5.1 inch refractor.

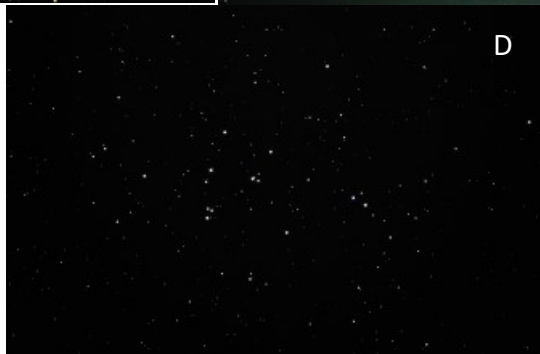
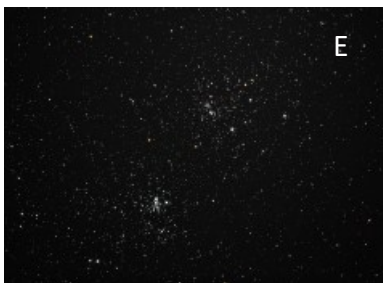
**NGC 2264** (Christmas Tree Cluster) and Cone Nebula: 10 minute exposure with a 5.1 inch refractor. The Christmas Tree cluster is the group of stars in the center of the image. The brightest star in the picture is the base of the “tree”, and its tip is the bright star visible about 25% of the way down from the center top edge. Just above this star one can see a fairly thin cone of dark nebulae. This is the Cone Nebula.



# MEMBER OBSERVATIONS

## **PAC POETRY: CAPTURING THE BEAUTY OF THE NIGHT SKY**

*The great romantic poet Lord Byron once wrote of beauty 'like the night of cloudless climes and starry nights.' PAC member Byron Davies took advantage of a rare cloudless night in our clime to capture these beautiful images, using a Canon T3i DSLR while on-camera guiding a Celestron AVX supporting a SkyWatcher 8-inch F/4 newtonian scope. Guide to the photos: M42 nebula in Orion (photo A); IC 434 Horsehead nebula and flame (photo B); the Pleiades open cluster (M45) in Taurus (photo C); the Beehive cluster (M44) in Cancer (photo D); and the NGC869/884 double cluster in Perseus (photo E). Beautiful work, Byron!*

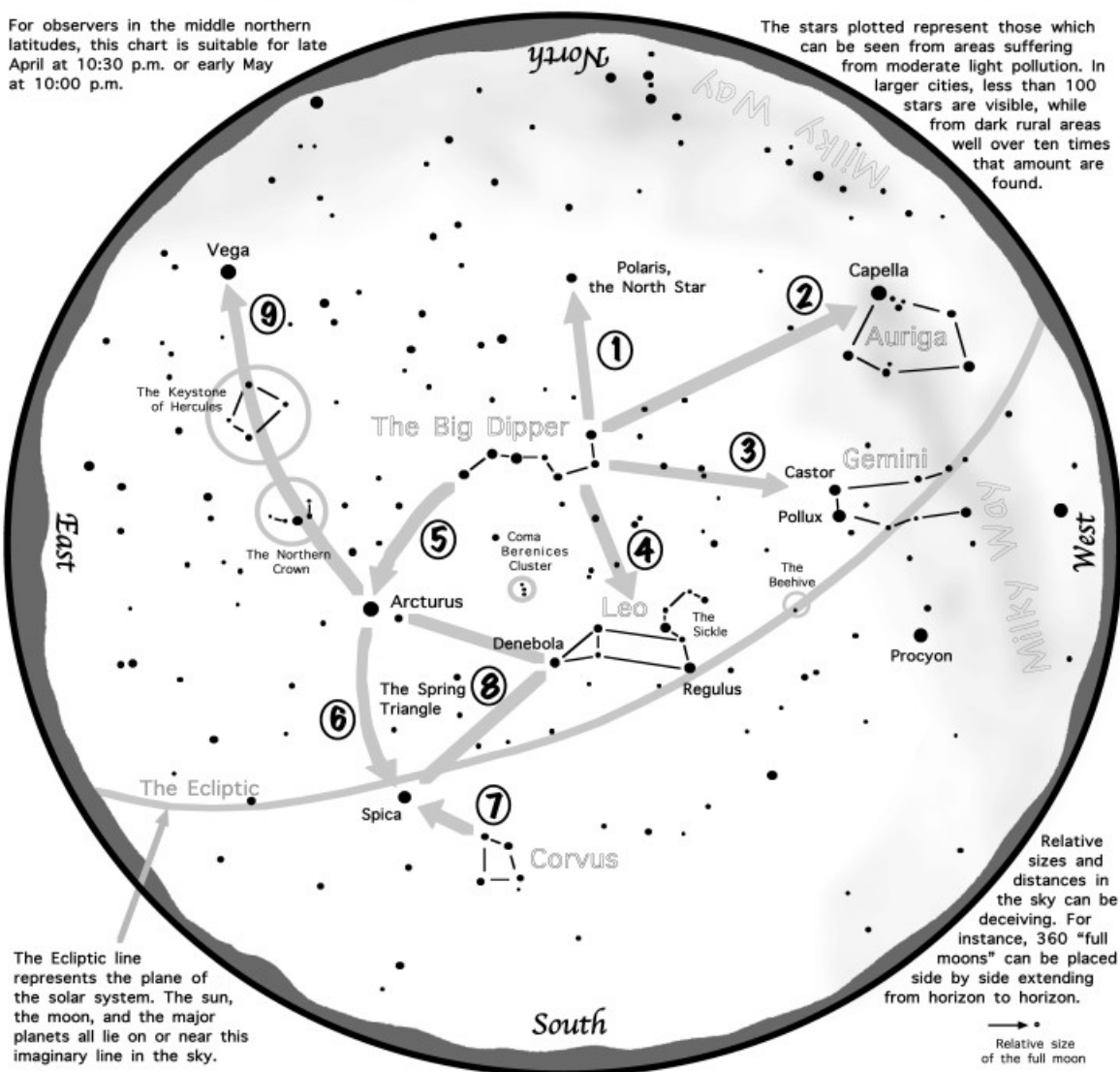




# Navigating the Spring Night Sky

For observers in the middle northern latitudes, this chart is suitable for late April at 10:30 p.m. or early May at 10:00 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 spring night sky isn't difficult.

Simply start with what you know or with what you can easily find.

*At this time of year in the early evening, the Big Dipper lies nearly overhead.*

- 1** Extend an imaginary line directly north from the two stars at the tip of the Dipper's bowl. It passes by Polaris, the North Star.
- 2** Draw another imaginary line across the top two stars of the Dipper's bowl. It strikes Capella low in the northwest.
- 3** Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
- 4** Directly below the Dipper's bowl reclines Leo with its primary star Regulus. The western portion of this zodiacal constellation forms a sickle or a "backwards question mark."
- 5** Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the spring night sky.
- 6** Then, the arc continues until it meets Spica, the brightest star in Virgo.
- 7** Confirm Spica by noting that two moderately bright stars just to its southwest form a straight line with it.
- 8** Arcturus, Spica, and another star, Denebola in Leo form the Spring Triangle, a large equilateral triangle.
- 9** From Arcturus, draw a line to Vega, a similarly bright star shining above the northeastern horizon. One third of the way sits "The Northern Crown." Two thirds of the way to Vega hides the "Keystone of Hercules." A dark sky is needed to see these two interesting but dim stellar configurations.



Astronomical League  
www.astroleague.org

Design by John Jacobson



**April  
2021**

## **January 6, 2021**

Just one day after the Earth passed its closest point to the Sun in its orbit, its perihelion, the American Astronomical Society was having its annual meeting online, the United States Congress was validating the results of the 2020 national election, and Wendee and I were settling in for a civics lesson about the way the United States Government works. The day did not turn out that way.

Shortly before noon, on our television set a news ticker appeared. It announced that two buildings in Library of Congress (LC), the James Madison, and quickly afterwards the Adams and Jefferson buildings, were being evacuated. That news sent a chill through me.

The LC is one of the finest libraries in the entire world. It contains more than 170 million books, of which more than thirty are books I wrote entirely or at least a foreword. It also includes all of the more than two hundred “Star Trails” columns I wrote for *Sky and Telescope* magazine between 1988 and 2008, and dozens more I wrote for other magazines and journals. Only the British library, with over 200 million books, is larger than the Library of Congress.

This event was personal for me. A few minutes later, when the entire Capitol complex was stormed, it was personal for all of us. All of us had reactions to this, but in addition to the feelings I

shared with most of you, I had an additional feeling – specifically about the library.

How many books does it take to make a library? When I was a child in 1963, a teacher gave the best answer I’ve ever heard: “two books.” For me, a library – any library – is every bit as priceless as a dark sky. The wisdom of the ages is contained in each library – from the LC to a child’s collection. I have never gone into a library without feeling better when I exited. The idea that this magnificent collection was threatened that day was terrifying.

I have read many books over my lifetime, from *The Cat in the Hat* to my boxed set of *Lord of the Rings*. One small treasure, Jene Lyon’s Golden book *Our Sun and the Worlds Around It*, began a lifetime of stargazing.

That gem, by the way, also lives in the LC. What is more, I have never encountered a really bad book. When an author places her or his thoughts on paper in a book, that book immortalizes those thoughts.

I hope that Capitol Hill and the Library of Congress are never threatened again. They belong to we the people, and stand beautifully in Washington, D.C. to govern us, teach us, and encourage us to follow our dreams and reach for the stars.



***The U.S. Capitol,  
as seen in this  
photo taken in  
May 1975 by  
David Levy.***

## A leonine constellation prowls the April night sky

Leo is a prominent sight for stargazers in April. Its famous sickle, punctuated by the bright star Regulus, draws many a beginning stargazer's eyes, inviting deeper looks into some of Leo's celestial delights, including a great double star and a famous galactic trio.

Leo's distinctive forward sickle, or "reverse question mark," is easy to spot as it climbs the skies in the southeast after sunset. If you are having a difficult time spotting the sickle, look for bright Sirius and Procyon and complete a triangle by drawing two lines to the east, joining at the bright star Regulus, the "period" in the reverse question mark.

Trailing them is a trio of bright stars forming an isosceles triangle, the brightest star in that formation named Denebola. Connecting these two patterns together forms the constellation of Leo the Lion, with the forward-facing sickle being the lion's head and mane, and the rear triangle its hindquarters. Can you see this mighty feline? It might help to imagine Leo proudly sitting up and staring straight ahead, like a celestial Sphinx.

If you peer deeper into Leo with a small telescope or binoculars, you'll find a notable double star! Look in the sickle of Leo for its second-brightest star, Algieba - also called Gamma Leonis. This star splits into two bright yellow stars with even a small magnification – you can make this "split" with binoculars, but it's more apparent with a telescope. Compare the color and intensity of these two stars - do you notice any differences? There are other multiple star systems in Leo – spend a few minutes scanning with your instrument of choice, and see what you discover.

One of the most famous sights in Leo is the "Leo Triplet": Three galaxies that appear to be close together. They are indeed gravitationally bound to one another, around 30 million light years away! You'll need a telescope to spot them, and use an eyepiece with a wide field of view to see all three galaxies at once! Look below the star Chertan to find these galaxies. Compare and contrast the appearance of each galaxy – while they are all spiral galaxies, each one is tilted at differ-



*The image at left of the 'Leo Triplet' galaxies was taken with the VLT Survey Telescope in Chile.*

ent angles to our point of view! Do they all look like spiral galaxies to you?

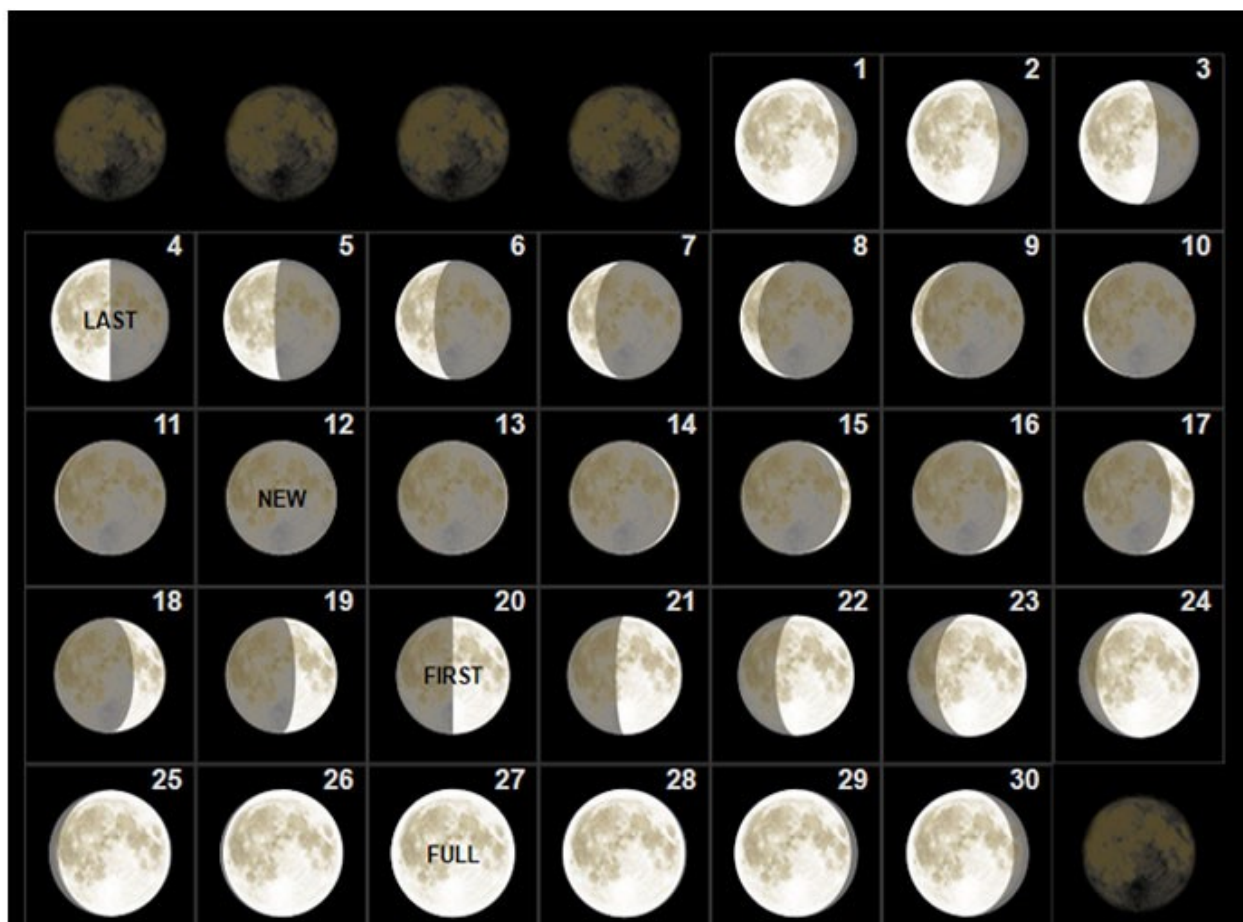
April is Citizen Science Month, and there are some fun Leo-related activities you can participate in! If you enjoy comparing the Triplets, the "Galaxy Zoo" project ([galaxyzoo.org](http://galaxyzoo.org)) could use your eyes to help classify different galaxies from sky survey data!

Looking at Leo itself can even help measure light pollution: the Globe at Night project ([globeatnight.org](http://globeatnight.org)) uses Leo as their target constellation for sky quality observations from the Northern Hemisphere for their April campaign, running from April 3-12. Find and participate in many more NASA community science programs at [science.nasa.gov/citizenscience](http://science.nasa.gov/citizenscience). Happy observing!

**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](http://nightsky.jpl.nasa.gov) to learn more.*

## ***MOON PHASES: APRIL 2021***



Per Native American tradition, the most common name for the full moon in April is “Pink Moon,” a reference to the color of the first wildflowers of spring. Other names for this full moon include “Frog Moon,” “Fish Moon” and “Sugar Maker Moon.” Anglo-Saxon tribes in what is now England referred to

### ***In the mid-April sky: The Lyrid meteor shower***

Every year, the month of April features the Lyrid meteor shower, which occurs sometime between April 16 and 25 and usually peaks in the early morning hours of April 22 or 23.

The Lyrids radiate from the constellation Lyra, not far from the bright star Vega. They originate from particles of dust and debris left from long-period comet C/1861 G1 Thatcher, which has an orbital period of about 415 years and won’t be visible from Earth again until 2276.

Most astronomy historians believe that the Lyrids are the earliest meteor shower ever recorded, with the first known observation dating to 687 BCE.

The Lyrids are unpredictable, sometimes producing just 20 shooting stars per hour but occasionally producing outbursts 100 or more, including fireballs that cast shadows and leave behind smoky trails.

In 1803, an outburst of Lyrids resulted in up to 700 meteors per hour; the storm of meteors was observed by a newspaper reporter in Richmond, Virginia, who wrote that it “alarmed many, and astonished every person that beheld it. From one until three in the morning, those starry meteors seemed to fall from every point in the heavens, in such numbers as to resemble a shower of sky rockets.”





## Astronomical League Observing Programs

If you'd like to earn some recognition for your observing skills, the Astronomical League currently offers more than 70 different observing programs. 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 earn certificates and pins for completing the programs. Click on the link above to find an alphabetical list of observing programs, from "Active Galactic Nuclei" to "Youth Astronomer."

Note that this year, in celebration of its 75th anniversary, is offering a special challenge to observers; complete this program, and you can earn the 75th Astronomical League Anniversary Certificate.



## SUBMISSIONS WELCOME!

We want to hear from you! If you have an article or photos to submit, or other items of interest, send them along to Reflections. Please send what you have to share no later than the 25th of the month, sooner if possible.

**Thank you!**



Click here to go to the Astronomical League website



**CLICK HERE FOR BACK ISSUES OF REFLECTIONS**



**CLICK HERE TO CONNECT WITH PAC ON FACEBOOK**



**CLICK HERE TO JOIN PAC OR RENEW YOUR MEMBERSHIP**



PAC belongs to the North Central Region of the Astronomical League; click here to check out NCRAL's website.



### NIABI ZOO OBSERVING: APRIL 17

A crescent moon will make for an ideal first object to observe this evening. The Orion Nebula will still be visible in the southwest. Because the Moon won't be too bright, many galaxies, globular clusters and open clusters will also be visible. The Beehive, an open cluster in Cancer, will be observable, as well as the Pleiades star cluster in Taurus. Planetary nebulae, like the Ghost of Jupiter and the Cat's Eye, will be visible. Nice observable galaxies like the Sombrero, the Black Eye, the Great Andromeda Galaxy should also be seen, weather permitting of course.

## ASTRO-TRIVIA ANSWER

The moons of *Uranus* are named for literary characters from Shakespeare and Pope.

# UPCOMING EVENTS



**Date: April 12, 2021**

**Event: Regular Meeting @ 7 p.m.**

**Location: Zoom / Butterworth Center**

- **Program : 'Skywatchers of North America,' by**
- **Bill Iseminger (see page 19)**

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

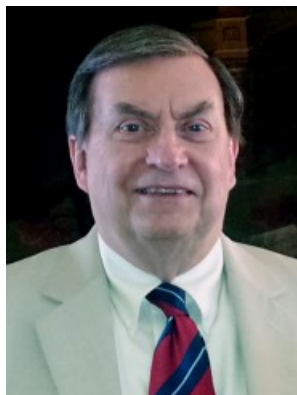
The April 12 meeting will once again be a 'hybrid' meeting, with limited in-person attendance at the Butterworth Center and all others welcome to attend virtually via Zoom. Contact Alan Sheidler if you plan to attend in person. Live public events will also resume in April.

## MORE UPCOMING EVENTS:

- **April 17:** Outreach at Niabi Zoo; sunset (*observing list on page 17*)
- **May 10:** PAC Regular Meeting at the Butterworth Center / Zoom at 7:00 p.m. Presentation via Zoom: "NASA Solar Missions" by Dr. Therese Kucera, astrophysicist with NASA's Goddard Space Flight Center in Greenbelt, Maryland
- **May 15:** Outreach at Niabi Zoo; sunset
- **June 5:** Outreach at Giant Goose Conservation Area in Atkinson, Illinois; 9 a.m. to 1 p.m.
- **June 12-13:** Outreach at 'Gateway to Space' weekend at Putnam Museum, Davenport; 10 a.m. to 5 p.m. Saturday, noon to 5 p.m. Sunday
- **June 14:** PAC Regular Meeting at the Butterworth Center / Zoom at 7:00 p.m. Presentation via Zoom: "Association of Lunar and Planetary Observers" by Matthew Will, Secretary and Treasurer of ALPO.
- **June 19:** Outreach at Niabi Zoo; sunset

MONTH	NEWSPAPER ARTICLES	CONSTELLATION REPORT	PROGRAM
MAY 2021	Dave Smith	AVAILABLE	Presentation: "NASA Solar Missions" by Dr. Therese Kucera, Goddard Space Flight Center
JUN 2021	Frank Stonestreet	AVAILABLE	Presentation: "Association of Lunar and Planetary Observers" by Matthew Will, ALPO Secretary & Treasurer
JUL 2021	AVAILABLE	AVAILABLE	Green Bank Observatory. Green Bank, West Virginia - Virtual Tour and Current Projects
AUG 2021	AVAILABLE	AVAILABLE	Annual PAC Picnic
SEPT 2021	AVAILABLE	AVAILABLE	Business Meeting; Smorgasbord of Member Presentations
OCT 2021	AVAILABLE	AVAILABLE	Annual PAC Banquet; Presentation: "Lunar Laser Ranging Project" by Dr. Russet McMillan, Apache Point Observatory, New Mexico
NOV 2021	AVAILABLE	AVAILABLE	Presentation: "M Dwarf Stars and the James Webb Space Telescope" by Katie Melbourne, Ball Aerospace Systems, Broomfield, Colorado
DEC 2021	AVAILABLE	AVAILABLE	The Year in Review — Roy Gustafson

## ***Biography of April presenter: Bill Iseminger***



Bill Iseminger was born in Bloomington, Illinois, and grew up in Arlington, Virginia. He earned his bachelor of arts degree in Anthropology at the University of Oklahoma and his master of arts degree at Southern Illinois University Carbondale.

Iseminger's archaeological experience includes projects in South Dakota and several regions in Illinois, including excavations and surveys at Dickson Mounds, Kincaid Creek, and the lower Kaskaskia River Valley. He began working at Cahokia Mounds in 1971 and for several years led public field schools in excavations on the Stockade, Woodhenge, and Mound 50. sites

Iseminger recently retired as Assistant Site Manager in charge of exhibits, interpretation, public relations, and intern programs. He has written extensively about Cahokia Mounds and archaeology, including his books *Cahokia Mounds: America's First City* and *Identifying and Understanding Artifacts of Illinois and Neighboring States*.

Bill and his wife, Gloria live in Columbia, Illinois.

### **SUMMARY OF MARCH MEETING**

For the first time in a year, the Popular Astronomy Club held a meeting with in-person attendees. The regular monthly meeting was held on March 8, with seven members attending in-person at Moline's Butterworth Center and 26 other members and guests attending virtually via Zoom.

PAC president Alan Sheidler began the meeting by announcing that there would be no public outreach event in March at Niabi Zoo, but that the club planned to resume monthly public viewing sessions at the zoo beginning on Saturday, April 17. Measures will be in place to prevent spread of the coronavirus, probably to include emphasizing viewing via video screens rather than through eyepieces.

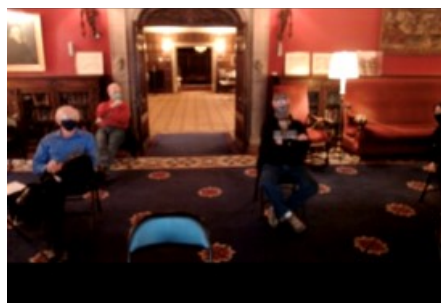
Several public outreach requests have been received, including one for Giant Goose Recreation Area and another for "Gateway to Space" at the Putnam Museum the weekend of June 12-13. PAC may also do a field trip to visit the facilities of the Peoria Astronomical Society (a member of that society attended the meeting via Zoom).

In addition, a teacher at John Deere Middle School in Moline is forming an astronomy club at the school and has requested support from PAC.

Dale Hatchel presented the treasurer's report, which was approved following a motion by Wayland Bauer and second by Rusty Case. Dale then discussed a telescope that had recently been donated to PAC and which he had tested and thought might be useful at public outreach events.

A "smorgasbord" of presentations then followed. Ally Nordick gave a constellation report on Orion; Roy Gustafson discussed how he used the same method as the ancient Greek Eratosthenes to calculate the circumference of Earth; Terry Dufek shared information on rare alignments of Jupiter's moons that will be visible this spring; Ann Bauer noted how the actor Tom Hanks and space go together; and Dino Milani spoke about the "Drake Equation," which measures the probability of the existence of intelligent life on other planets capable of communicating with us.

The meeting adjourned at 8:30 p.m.; the next monthly meeting, which will also probably be a "hybrid," is scheduled for April 12.



***Meeting attendees observe social distancing at the Butterworth Center.***

**TREASURER'S REPORT**

from 1/1/2021 to 2/28/2021

description	current period detail	current	YTD
Receipts:			
memberships	1 new, 5 renewals	187.50	187.50
member donations	1 sustaining renewal	30.00	30.00
program donations			
misc donations			
interest		0.09	0.09
banquets			
birdies			
special			
sales			
other			
Total Receipts		217.59	217.59

Expenditures:			
programs			
speakers	Feb. speaker	20.00	20.00
PACMO operation			
observatory	rent and utilities	301.00	301.00
equipment			
maintenance			
Astronomical League			
insurance	PACMO insurance	162.00	162.00
operating supplies			
newsletter			
web page			
banquet			
donations			
miscellaneous			
legal			
observatory upgrade			
other			
adjustments			
Total Expenditures		483.00	483.00

Balances	as of 2/28/2021		
previous balance			
net change	-265.41	-265.41	
ending balance	-265.41	-265.41	
check account		2374.41	
money market account		5414.78	
savings account		10.23	
business special		45.44	
cash		0.00	
undeposited checks		0.00	
Total Cash Assets		7844.86	

**Popular Astronomy Club of the Quad Cities, Inc.**<http://www.popularastronomyclub.org/>