



# Reflections

The Newsletter of the Popular Astronomy Club

ESTABLISHED 1936



July 2020

## President's Corner July 2020



Alan Sheidler

Welcome to "Reflections", the newsletter of the Popular Astronomy Club. This month's edition has many articles about observing sessions, club activities and space science. On the topic of observing,

your club has been very active with club members convening to pursue observing programs and astro-imaging. A number of us have successfully completed the NCRAL Spring Seasonal Messier Marathon list thus earning the award associated with successful completion of the list. Now that astronomical Summer has arrived, we are now pursuing the NCRAL Summer Seasonal Messier Marathon list. One of the main goals of this program is to encourage members to get out and do some observing. What I like about this program is that it is very doable. Goto telescopes can be used, which enables virtually anyone to locate and observe these objects easily within a couple hours (as long as the weather cooperates). The Summer Messier list consists of 28 objects. Fifteen of

*(Continued in next column)*

these are globular clusters, six are open star clusters, four are bright nebulae, and three are galaxies. Because most of these are brighter objects, these are ideal for visual observing and are excellent targets for practicing astro-photography. Six of my favorite summer objects are The Lagoon Nebula M8, The Hercules Cluster M13, The Omega (Swan) Nebula M17, The Trifid Nebula M20, The Sagittarius Cluster M22 and The Sagittarius Star Cloud M24. All of these are included in the Summer Messier list and are must see objects in any observing program. July is also a great time to observe the planets Jupiter and Saturn which are nearing opposition meaning they are visible essentially all night long. Join one of our club observing sessions and discover the amazing wonders of our universe all of which are within your grasp as a member of the Popular Astronomy Club.

On the topic of space travel, it was 51 years ago this month that man first slipped the surly bonds of Earth's gravity and set foot on another planetary object (the Moon). Apollo 11 astronauts Neil Armstrong and Buzz Aldrin became the first humans to walk on the moon. These astronauts certainly are the most famous members of the Apollo team, but if it were not for the key contribution of Dick Koos, the first moon landing would very likely have been aborted. Mr. Koos was simulation supervisor for Apollo 11 and was responsible to ensure the mission control team was prepared to handle any emergency likely to be encountered during the mission. Eleven days prior to launch during a landing exercise, Mr. Koos deliberately triggered a scenario where the lunar module's computer would be overloaded, thus generating "Program Error - 1201" alarms. Mission control had not seen errors of this type in previous simulations,

*(Continued on next page)*

M22, Sagittarius Cluster, the great globular cluster in the constellation of Sagittarius.

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and erring on the side of safety decided to abort the training exercise, thus ending the simulated moon landing.

During the mission debriefing, Mr. Koos explained the 1201 alarm was not "mission critical" and that although the computer was overloaded, it had nevertheless maintained critical system functions throughout the exercise. Non-critical computer tasks may have been dropped, but all mission critical tasks were preserved. If this had actually happened during the actual moon mission, the moon landing would have been inappropriately aborted.

As a result of Mr. Koos' simulated "curveball" computer error, mission control went through all possible computer malfunctions and prioritized them for proper response by mission control during the actual missions. As chance would have it, during Apollo 11, computer program errors "1201" and "1202" began cropping up during that first fateful lunar landing. Since these errors were not mission critical, mission control advised Armstrong and Aldrin to continue the landing which, as we know, was successful. Almost certainly that first landing would have been aborted were it not for Dick Koos' insight.

I am very pleased to inform you that Mr. Dick Koos has agreed to be a special guest speaker for our July 13<sup>th</sup> PAC meeting at 7:00pm. Please plan to attend this meeting which will be held as a Zoom virtual meeting.

If you are interested in attending this meeting and learn about his life and contributions to one of the most important technological achievements of all time, please use email address below for link information to the event. Keep Looking up!

**Alan Sheidler**

*Editors note: For link information to meeting send email to:*  
[t\\_dufek@msn.com](mailto:t_dufek@msn.com)

## 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 Program Rules](#)

[NCRAL WINTER Seasonal Messier List](#)

[NCRAL SPRING Seasonal Messier List](#)

[NCRAL SUMMER Seasonal Messier List](#)

[NCRAL AUTUMN Seasonal Messier List](#)

**meteoblue**  
weather ✨ close to you



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# ANNOUNCEMENTS / INFO

**LOOKING FOR  
OLDER ISSUES OF  
REFLECTIONS  
NEWSLETTER?**



**HISTORY OF PAC?**



**Popular Astronomy Club  
on Facebook?**



## Astronomical League Observing Programs

The Astronomical League provides many different Observing Programs. These Observing Programs are designed to provide a direction for your observations and to provide a goal. The Observing Programs have certificates and pins to recognize the observers' accomplishments and for demonstrating their observing skills with a variety of instruments and objects



**READY FOR  
MEMBERSHIP  
OR TO RENEW?**



For PAC Documents  
Use  
**"Enrollment Form"**



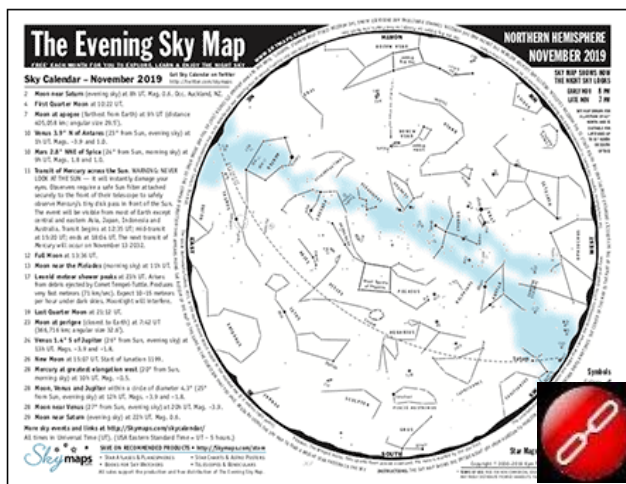
## SUBMISSIONS

If you have an article or photos to submit or items of interest, we encourage you to send them in by the 25th of the month. Links to stories are welcome also.

**Thank you!**



Check out the Astronomical  
League **ONLINE!**



Check out  
the North  
Central  
Region  
of the  
Astronomical  
League  
(NCRAL)  
online



# CONTRIBUTIONS



## Telrad Dew Shield

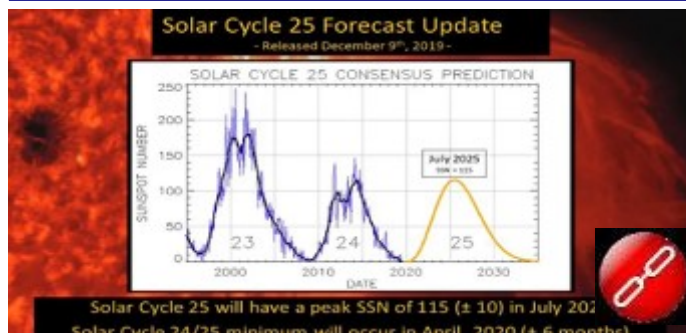


Created by Rod Nabholz



This is dew shield that I found online for the Telrad finder and it seems to be a perfect and less costly solution to a very annoying problem. Created out of craft (closed cell) foam, it was quickly assembled and now, just waiting to try it out.

Terry Dufek



The NOAA-NASA international panel released this forecast for Solar Cycle 25. The peak, when solar activity from flares, sunspots and coronal mass ejections, will reach maximum, is expected in July 2025 (+/- 8 months). At this point the Sun's magnet field will also flips again.

## BBC's The Sky At Night

## Different Planet Different Sky



Red Henry ▸ VISUAL ASTRONOMY

7 hrs · 🌐

Just posted by Ken Gittens in the North Georgia group: here are observations by a highly skilled observer using the best (quite small) telescopes available at the time.

In the 1700s, this was superb visual work. ☹️ If some of Messier's observations seem inaccurate or incomplete today, just remember that he had NOTHING to go on. ☹️ He was writing the book.



MESSIER.OBSPM.FR

### Charles Messier's Original Catalog of 1771

Several Astronomers have worked on the research of the nebulous Stars, namely Hévelius, Huygens, Derham, Halley, Cheseaux, the Abbé de la...

👍 3

👍 Like

💬 Comment

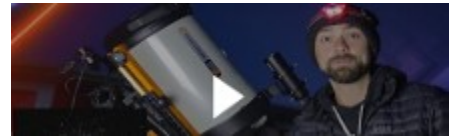


# CONTRIBUTIONS



*Some **You Tube** videos for you to view while being home bound*

**Taking Pictures of Stars at the  
2000mm Focal Length**



**50-inch Telescope Installation**



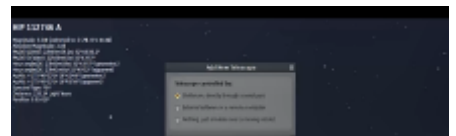
**How to Photograph the International  
Space Station (ISS)**



**What's in the Night Sky July 2020**



**How to Connect a Telescope to Stellarium**



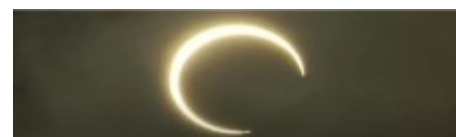
**Astronomy Cast Ep. 571: Extreme Binaries**



**I Took a Picture of SATURN Through my  
Telescope**



**Solar Eclipse Ring of Fire 21st June 2020**





# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT

## Repair Day at Paul Castle

Here's the group picture from the Paul Castle Observatory yesterday (May 30th, 2020) afternoon as we were grilling steaks, brats and hot dogs. Mike, sorry I missed you in the photograph. Next time I will try to remember to get the camera out before anyone has a chance to escape! Thanks you all for coming out and lending a hand. Keep looking up.

### Al Sheidler

*Editors Note: Attending were Al and Eric Sheidler, the Nordicks, Rusty Case, Ken Boquist, Mike Gacioch (not pictured), John Douglas, Dale Hachtel, and Terry Dufek., Work completed that day was repairing the walls to the observatory by replacing damaged boards, removing the remaining electrical conduit from the base and reviewing the upcoming installation of the pier.*



## Pier Construction at Paul Castle

Here are a few pictures from today's (June 6th) pier foundation construction effort. This was a very superior effort by everyone. Thank you all very much for the hard work. In attendance were: Gary, Chris, and Ally Nordick, Mike Gacioch, Terry Dufek, Dale Hachtel, Rusty Case, Eric & Al Sheidler. The pictures are not necessarily in the correct order, but I think you can figure the sequence. This project is going swimmingly. Thanks to everyone and especially to Gary for the use of all the fun equipment.

### Al Sheidler

*Editors note: more photos on the following pages. I tried to put them into order as bet I could.*





# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT



Rusty constructing the rebar structure (the day before)  
to be inserted into the tube for strengthening and support



The tube inserted, cut to length and filled in around with sand  
and packed down with clay soil



Drill, Gary, Drill



Terry and Eric insert the  
rebar structure into the  
tube and orientate it per  
Rusty's instructions



# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT



Rusty gives his approval that all is ready



Checking to make sure that the base is level and spaced out as there are adjustment nuts underneath that we may need to get to.



Gary and Al mix cement and pour into the tube.





# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT

## Pier Construction / Deck Restoration

We had a great day of rebuilding activities at the PRC memorial observatory yesterday (June 13th, 2020) . We started out in the morning by welding the pier. Special thanks to Steven Case for his welding expertise and hard work on the pier. The rest of the day we occupied ourselves by reassembling the deck, sanding, grilling, solar observing, and staining the deck. This was a really great and successful day. Those in attendance were Ken Boquist, Rusty Case, Steven Case, Byron Davies, John Douglas, Terry Dufek, Dale Hachtel, Alex Holt, Hugh Holt, Mary Holt, Alan Sheidler and Eric Sheidler. Many thanks to everyone who participated.

**Al Sheidler**







# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT





# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT





# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT

**Walls back up !  
June 15th, 2020**

Yesterday we got together and reassembled the walls of the observatory. We had plenty of help which allowed reassembly of the walls to occur in just about 2 short hours. Things are coming together nicely indeed. Next will be to install new siding and to reinstall the dome. In the group photo are: on the ground, Terry Dufek, Al Sheidler, John Douglas, Gary Nordick, Wayland Bauer, Rusty Case and Dale Hachtel; standing on the observatory, Hugh, Tim, Alex and Mary Holt. Thanks to everyone for a job well done!  
**Al Sheidler**





# THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT

## Dome Refinishing Complete

Dale Hachtel and I stopped in at Jackson Autobody today (June 19th) and picked up the dome sections which they repainted for us. The finish looks "luxury auto perfect"! They are now in Gary Nordick's barn as we wait for his siding guy to put steel siding on the observatory walls. Then we will have another club work session to reassemble the dome. Rusty has ordered the dome opener for us. Thank you to everyone who has helped with this project and please watch for upcoming emails. Clear skies,  
**Al Sheidler**



## Wall Décor for Paul Castle

Below is a sample of one of the 12 constellations of the ecliptic that will be going on the wall of the observatory. These will replace the 12 that were on the wall before the take down. They will be printed on heavy duty photo paper and put in photo frame holders at the corner supports. They are 4X6 in design.



# ASTRONOMY IN PRINT

## June Skies and a Strawberry Moon

By Terry Dufek

With warm weather and pleasant temperature brings the lazy spring nights that most of us that follow astronomy and looking at the skies enjoy. Starting of the month, catch a brief glimpse (with particularly good eyes or binoculars) of our inner most planet, Mercury, in the west- northwest evening sky. It is about 7° off the horizon at 9:30 pm. It has a distinct reddish glow to it.

The  $\frac{3}{4}$  full Moon is almost due south on June 1st. Use binoculars to identify the many craters and maria (dark patches of lava) that cover the side that faces the Earth. Find a feature labeled map of the surface from the internet and see how many craters and features you can identify. The Moon moves into its full phase on June 5<sup>th</sup> and is also known as the Strawberry Moon. This full moon was known by Native American tribe to signal the time of the year to gather ripening fruit and coincides with the peak of the strawberry harvesting season. It is also known as the Rose Moon and the Honey Moon.

Almost straight over head is the bright star Arcturus. It is the brightest star in the constellation Boötes. The constellation kind of looks like a kite. Arcturus, along with the stars Spic (in Virgo) and Regulus (in Leo) form the Spring Triangle asterism (pattern or group of stars). Arcturus is a relatively close star at 36.7 light years. It is an aging star at 7 billion years old. Because of Arcturus position relative to the Sun, it has a high proper motion. In about 4000 years, it will get as close to the Sun as it will get. The star has a nice reddish tinge to it.

High in northeast sky is the star Vega. It burns bluish- white, indicative of the stellar hellish furnace that is burning there. It is about 1/10 of the age of the Sun. At the rate it is burning, it is expected to only last about 1/10 of the Sun's lifespan. It rotates so fast that close up, it would look like a very squat tomato. Vega used to be the pole star (the point in the sky that all stars seem to move about) in 12000 BC. It will be again in 14000 AD. This is because of the wobbling of the Earth on its axis called Precession.

*(Continued in next column)*

The Big Dipper, another asterism, is high overhead in the evening sky. It is part of the bigger constellation, Ursa Major. The two stars at the end of the bowl in the dipper point toward Polaris, the current pole star. The trail of stars that mark the handle, point toward the star Arcturus. The Big Dipper looks different across the world. In England, it is known as a plough, and in eastern Europe, a wagon. All seven stars of the dipper are moving together through space and it is thought they were once very much closer together, suggest a close star cluster.

On June 20<sup>th</sup>, begins the 1<sup>st</sup> day of Summer in the northern hemisphere. Known as the Summer solstice, the Earth will be tilted toward the Sun as far as it can go. The southern hemisphere will be starting its winter season, being tilted away. An interesting fact is because of the Precession (or wobble) of the Earth, in 13000 years the seasons will reverse, and June 20<sup>th</sup> will be the start of winter in the Northern Hemisphere.

Lastly, the end of the month brings Jupiter and Saturn peaking over the south east horizon at 10:30 PM. They are almost as close as they are going to get to the Earth. Jupiter is 387 million miles from Earth and Saturn is 842 million miles. A good pair of binoculars or small telescope will bring out Jupiter's bands or its four Galilean moons. With Saturn you can see the planet's marvelous rings of ice and maybe its moon Titan. The rings are enormous and if Saturn was as close as Jupiter, you might be able to see them in the sky with just eyesight. The two planets are separated by  $5\frac{1}{2}^\circ$ . They will slowly get closer in the next six months as Jupiter slowly overtakes Saturn and they get to less than  $1/12^\circ$  apart on December 21<sup>st</sup>, 2020.

Terry Dufek is a member of the Popular Astronomy Club which meets on the 2nd Monday of each month at 7:00 pm at Butterworth Center in Moline, Illinois. The club also has night-time public observing sessions every 3rd Saturday of the month, March through November, at Niabi Zoo in Coal Valley, Illinois. These dates may be cancelled based on current conditions so check our website or our home on Facebook.





June  
2020

### Castor House

A number of years ago, my friend Scott Roberts, then of Meade Instruments, sent Wendee and me two small “ETX” telescopes. We brought them both out to a picnic table we had set up in the yard to the south of our home. We turned on their motors and quickly learned how to move them across the sky; as it was Wendee’s first time with a new telescope, she was not as fast as she is now. At one point, Wendee went into the house to answer the telephone. She came out again to find both telescopes purring nicely, with me, and an enormous smile on my face, sitting between them. I grinned like a Cheshire cat.

I have never forgotten that night. We now have a small shed at the spot, and Castor, on a tripod, sits inside along with a lawn chair I use for meteor observing. Castor house, as I call it, is now one of my favourite viewing spots. It affords a magnificent view of the night sky, especially for watching meteors. I even installed an outdoor speaker there that carries music from KUAT-FM, our local classical music radio station. I walk out there almost every evening, just to check on the sky.

What do I check for? One never knows when the sky will offer something new and unexpected. What if, since the night before, a distant sun somewhere in our galaxy has awakened, thrown off its covers, and rose in brightness as an exploding star or a nova? These events cannot be predicted. In 1572, the Danish astronomer Tycho Brahe peered skyward and saw a brilliant new star in the constellation of Cassiopeia. What he saw was not an “ordinary” nova wherein the star rises and fades in brightness. His star was a supernova that resulted in the total collapse and destruction of the star. Just 32 years later, his student, Johannes Kepler, discovered a second supernova in the constellation of Ophiuchus.

*(Continued in next column)*

Since then, 416 years later, there has not been one visible supernova in our own galaxy.

On August 30, 1975, I stepped out of a car on my way to a card game, looked up, and saw what appeared to be a slow moving satellite near the bright star Deneb. I went indoors, then stepped outside again to note that the satellite was moving very, very slowly indeed. Then I understood that the “satellite” was not moving at all. I had made an independent discovery of an exploding star, not a supernova but an “ordinary” nova. Three years later, on September 12, 1978, from a campground in the Adirondack mountains, I independently found a second nova.

Most of these ordinary novae, like the two I found, can recur, again and again. In fact, there is one star that has already exploded twice in recent memory. On May 12, 1866, the star named T Coronae Borealis or the “Blaze Star”, rose to almost second magnitude. On February 9, 1946 it erupted again, this time to about third magnitude. There is a very good chance that within the next decade it will explode again. Stars like T coronae Borealis are called “recurrent novae.”

When will the next unexpected stellar event disturb the symmetry of the familiar night sky? We are surely due for one. How about tonight? Wouldn’t that be fun? The night sky is lovely and beautiful, but it is also astounding. We just never know what will come next. Maybe tonight I will find one again, as I stroll by Castor House.



# UPCOMING EVENTS



**Date: July 13th, 2020**

**Event: PAC Monthly Meeting**

**Location: Zoom Online at 7:00 pm**

**(please start logging on by 6:50 pm for a 7pm start)**

**Email to [t\\_dufek@msn.com](mailto:t_dufek@msn.com) for login information**

**Constellation Report : None Scheduled**

**All these dates and times are Tentative due to conditions! Please check your emails for any updates as to whether the Event will Occur!**

- **July 18th, 2020** Niabi Outreach at sunset (?)
- **July 25th, 2020** Woodhaven Lakes, 509 LaMoille Road, Sublette, Illinois. (?)
- **August 1st, 2020** Illiniwek Campground 8:00 –11:00 pm (rain date August 22nd)
- **August 8th, 2020** PAC Annual Picnic
- **August 15th, 2020** Niabi Outreach at sunset
- **September 14th, 2020** PAC business meeting at Butterworth Center at 7:00 PM
- **September 19th, 2020** Niabi Outreach at sunset
- **October 17th, 2020** Niabi Outreach at sunset
- **October 24th, 2020** PAC Annual Banquet
- **November 9th, 2020** PAC regular meeting at Butterworth Center at 7:00 PM
- **November 21st, 2020** Niabi Outreach at sunset
- **December 14th, 2020** PAC Business meeting at Butterworth Center at 7:00 PM.
- **January 11th 2021** PAC regular meeting at Butterworth Center at 7:00 PM
- **February 8th, 2021** PAC regular meeting at Butterworth Center at 7:00 PM

**Mark your calendars and watch upcoming e-mails for more information!**

## Go For Landing

Mr. Koos is scheduled to be our special guest at the next PAC meeting July 13 with his program "Go For Landing". Here is some background information I found about him on-line:





# SIGN UP REPORT

MONTH	NEWSPAPER ARTICLES	CONSTELLATION REPORT	PROGRAM
APR 2020	Jeff Struve	Frank Stonestreet	Mr. Jim Dole & Mr. Tom Dunmore, Firebaugh Observatory
MAY 2020	Dino Milani	Byron Davies	Ian Spangenberg
JUNE 2020	Terry Dufek	Anne Bauer	SMORGASBORD (SEE BELOW)
JULY 2020	Jeff Struve	None Scheduled	Mr. Dick Koos, "Go For Landing"
AUG 2020		PICNIC	PICNIC
SEPT 2020	Ian Spangenberg	Ian Spangenberg	Mr. Zach Luppen, University of Iowa, Zach will discuss the upcoming JUICE and Europa Clipper Missions )
OCT 2020	Paul Levesque	BANQUET	BANQUET
NOV 2020			Ian Spangenberg
DEC 2020	Terry Dufek		
JAN 2021			Roy Gustafson (Year n Review)
FEB 2021			
MAR 2021			SMORGASBORD (SEE BELOW)

**Editors Note:** If you are interested in contributing/ participating in the above programs, sign ups are available at the monthly meeting or please let The Vice President and Editor know what you are good to go with.. Any corrections please send to Vice President and Editor. This will be updated every issue.

**Thank you**

**All these dates and times are Tentative due to conditions! Please check your emails for any updates as to whether the Event will Occur!**

## SMORGASBORD

### MARCH

_____	_____
_____	_____
_____	_____

### JUNE

_____	_____
_____	_____
_____	_____

### SEPTEMBER

_____	_____
_____	_____
_____	_____

# ASTRONOMICAL CALENDAR OF EVENTS



# THE PLANETS July 2020



(CST) adjusted for Daylight Savings Time when applicable

Jul 03 22:18 Moon at Descending Node  
Jul 04 08:00 **Earth at Aphelion: 1.01669 AU**  
Jul 04 23:30 Pen. Lunar Eclipse; mag=0.355  
Jul 04 23:44 **FULL MOON**  
Jul 05 16:37 Jupiter 1.9°N of Moon  
Jul 06 03:45 Saturn 2.5°N of Moon  
Jul 10 07:00 Venus at Aphelion  
Jul 11 07:10 Venus 1.0°N of Aldebaran  
Jul 11 14:36:00 Mars 2.0°N of Moon  
Jul 12 14:27 **Moon at Apogee: 404201 km**  
Jul 12 18:29 **LAST QUARTER MOON**  
Jul 14 02:00 **Jupiter at Opposition**  
Jul 16 20:21 Aldebaran 3.8°S of Moon  
Jul 17 02:26 Venus 3.1°S of Moon  
Jul 18 07:33 Moon at Ascending Node  
Jul 18 22:54 Mercury 3.9°S of Moon  
Jul 20 12:33 **NEW MOON**  
Jul 20 17:00 **Saturn at Opposition**  
Jul 22 10:00 **Mercury at Greatest Elongation 20.1°W**  
Jul 22 15:50 Regulus 4.3°S of Moon  
Jul 24 23:54 **Moon at Perigee: 368367 km**  
Jul 27 07:32 **FIRST QUARTER MOON**  
Jul 27 16:00 **Delta-Aquarid Meteor Shower**  
Jul 31 04:32 Moon at Descending Node

**Sun** starts of in Gemini on July 1st. It moves into Cancer on the 20th.

**Mercury** is SW of the Sun on July 1st by 4° 10' in the morning sky (mag: 5.61, dia 11.93", Illum: .8%). The planet continues to put some distance between it and the Sun until greatest western elongation from the Sun on the 22<sup>nd</sup>. It is mag: .21, dia: 7.81" and Illum: 37%. After which, Mercury heads back toward a conjunction with the Sun in August. On the 19<sup>th</sup>, Mercury is about 4° to the right of the Moon on the E-NE horizon at 5 am.

**Venus** is in Taurus on July 1<sup>st</sup>. It is 14 1/2° above the eastern horizon at 5 am (mag: -4.67, dia: 42.81, Il-

lum: 77%). On July 12<sup>th</sup>, Venus is about 1° north of 1<sup>st</sup> magnitude star Aldebaran. On July 17<sup>th</sup>, Venus makes a nice combination with a 26-day old crescent Moon and Aldebaran. By months end, Venus is 24 ° above the eastern horizon at 5 am.

**Mars** is in Pisces on July 1<sup>st</sup>. It is 34° above the SE horizon at 4 am (mag: -.51, dia: 11.48", Illum: 84.5%). The red planet is about 5° north of the 20-day old last quarter Moon on the 11<sup>th</sup>. By the 31<sup>st</sup>, the planet has brightened to -1.10 and size has grown to 14.63".

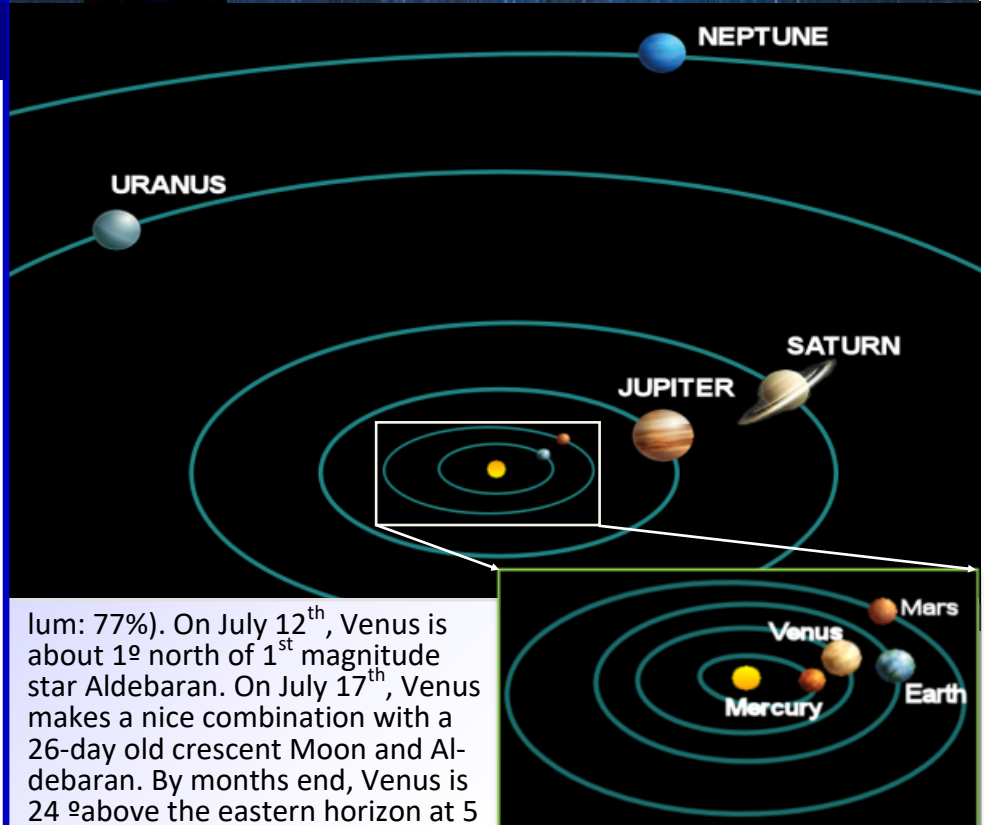
**Jupiter** is in Sagittarius on July 1st. It rises at 9:22 pm (mag: -2.73, dia: 47.33"). Saturn is 6° to the east. The king of the planets reaches opposition on July 14<sup>th</sup>. Jupiter, Saturn and the Full Moon make a nice triangle conjunction for viewing on July 5<sup>th</sup>. The separation between all 3 are about 3 to 5°. On the 31<sup>st</sup>, the 3 line up a gain in a row. The separation between Saturn and Jupiter is now 7°.

**Saturn** just enters Capricornus on July 1st. It rises at 9:45 pm

(mag: .21, Dia: 18.37", rings: 42.79). The planet is 6° to the left of Jupiter (See Jupiter for all interaction with Saturn, Jupiter and the Moon for July). The planet reaches opposition on July 20<sup>th</sup> and is magnitude .10. These are not good oppositions for Saturn and Jupiter as they are about as far down as they can get on the ecliptic.

**Uranus** is in Aries on July 1<sup>st</sup>. It is about 22 ° above the eastern horizon at 4:00 am (mag: 5.83, dia: 13.28"). On the 14<sup>th</sup>, the Moon is 4°.

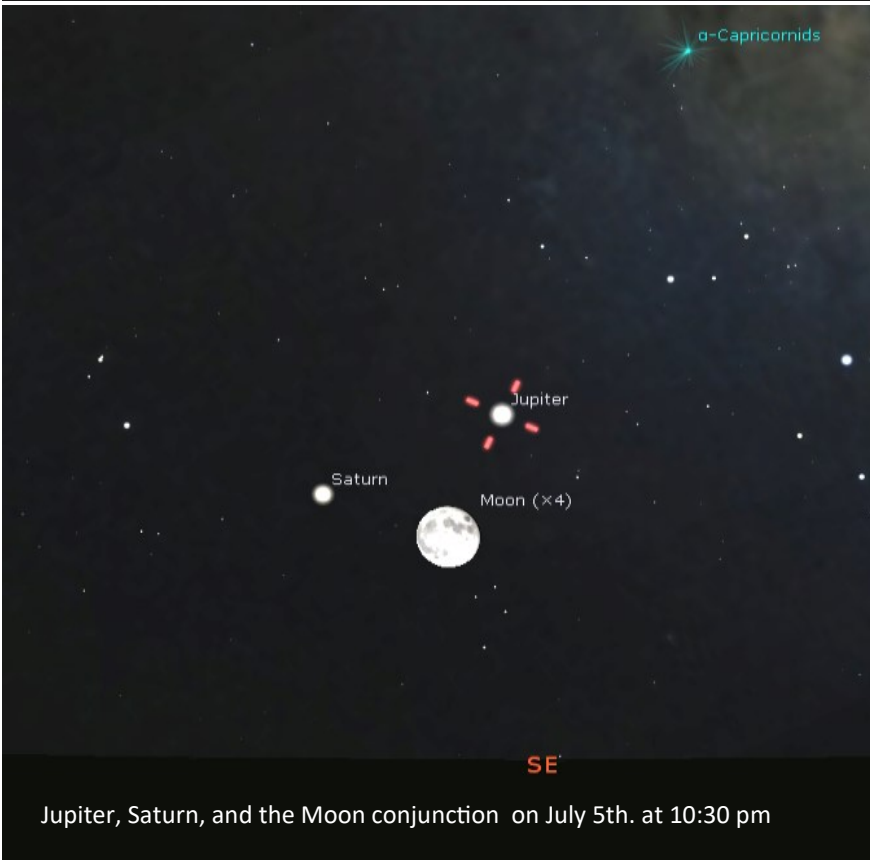
**Neptune** is in Aquarius on the 1<sup>st</sup>. It is 37° 21' of the SE horizon at 4:00 am. Neptune (mag: 7.87, dia: 2.31") is 11° to the east of Mars. On the 10<sup>th</sup>, the Moon swings about 4° south of the planet.







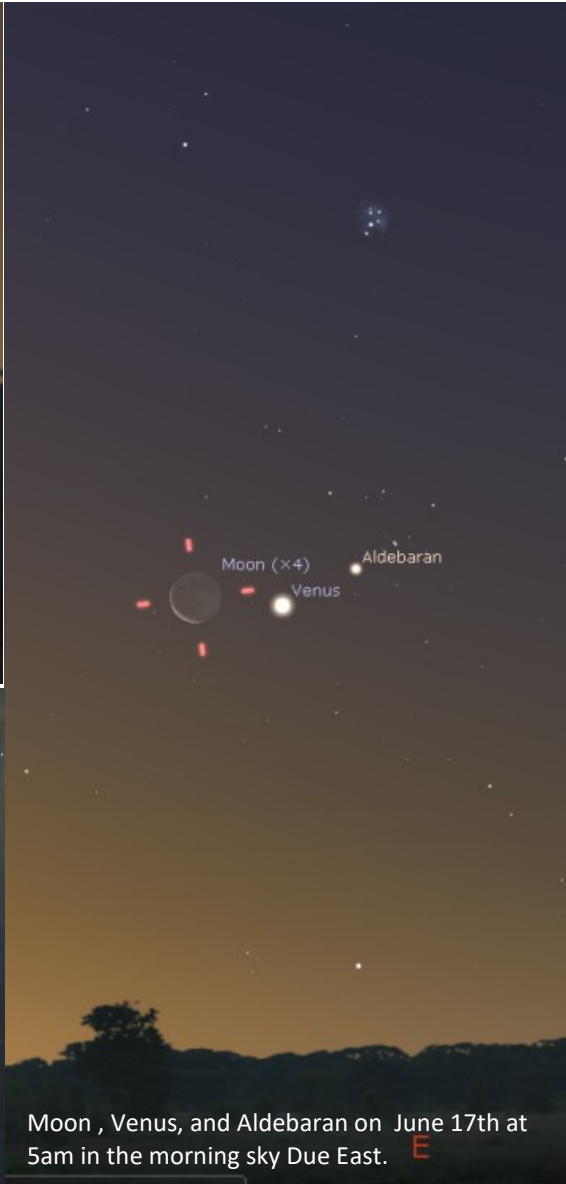
Mercury and the Moon July 19, 5:00 am morning sky, NE-E



Jupiter, Saturn, and the Moon conjunction on July 5th. at 10:30 pm



Jupiter, Saturn and the Moon line up again on the 31st at 10:00 pm



Moon, Venus, and Aldebaran on June 17th at 5am in the morning sky Due East. E



Uranus is about 4° north of the Moon on July 14th at 4:00 am.

# Planetary Alignments in July 2020

Phenomenon	Date and Time	Object 1	Object 2	Separation
Conjunction	2020-07-05 16:00:07	Moon	Jupiter	+2°13'39.2"
Conjunction	2020-07-05 16:54:57	Moon	Pluto	+1°39'13.2"
Transit	2020-07-09 04:45:30	Jupiter	Callisto (JIV)	—
Occultation	2020-07-11 11:58:14	Jupiter	Io (JI)	—
Conjunction	2020-07-11 16:50:44	Mars	Moon	+2°12'40.9"
Occultation	2020-07-15 04:42:18	Jupiter	Europa (JII)	—
Conjunction	2020-07-17 00:36:12	Moon	Venus	+2°13'14.9"
Occultation	2020-07-17 13:35:18	Jupiter	Callisto (JIV)	—
Conjunction	2020-07-19 22:29:38	Moon	(4) Vesta	+0°46'08.2"
Occultation	2020-07-23 20:59:38	Jupiter	Io (JI)	—
Transit	2020-07-24 10:08:33	Jupiter	Ganymede (JIII)	—
Transit	2020-07-25 18:55:55	Jupiter	Callisto (JIV)	—
Transit	2020-07-31 20:00:35	Jupiter	Io (JI)	—
Conjunction	2020-08-01 17:01:59	Jupiter	Moon	+2°05'43.1"

From stellarium



From in the sky. org

## July Double Stars

Index	Object	R.A.	Dec.	Mag.	Sep.	P.A.	Year
58	Mu Bootis	15 <sup>h</sup> 24 <sup>m</sup> .5	+37° 23'	4.3, 7.1	109"	171°	2013
59	Delta Serpentis	15 <sup>h</sup> 34 <sup>m</sup> .8	+10° 32'	4.2, 5.2	4.0"	172°	2013
60	Zeta Corona Borealis	15 <sup>h</sup> 39 <sup>m</sup> .4	+36° 38'	5.0, 5.9	6.4"	306°	2013
61	Xi Scorpii	16 <sup>h</sup> 04 <sup>m</sup> .4	-11° 22'	4.9, 7.3	7.6"	42°	2012
62	Struve 1999	16 <sup>h</sup> 04 <sup>m</sup> .4	-11° 27'	7.5, 8.1	11.9"	98°	2013
63	Beta Scorpii	16 <sup>h</sup> 05 <sup>m</sup> .4	-19° 48'	2.6, 4.5	13.6"	20°	2013
64	Kappa Herculis	16 <sup>h</sup> 08 <sup>m</sup> .1	+17° 03'	5.1, 6.2	25.7"	11°	2013
65	Nu Scorpii	16 <sup>h</sup> 12 <sup>m</sup> .0	-19° 28'	4.4, 6.6	41.4"	336°	2013
66	Sigma Corona Borealis	16 <sup>h</sup> 14 <sup>m</sup> .7	+33° 52'	5.6, 6.5	7.2"	238°	2013
67	16/17 Draconis	16 <sup>h</sup> 36 <sup>m</sup> .2	+52° 55'	5.4, 6.4, 5.5	3.1", 90.1"	104°, 193°	2013
68	Mu Draconis	17 <sup>h</sup> 05 <sup>m</sup> .3	+54° 28'	5.7, 5.7	2.4"	5°	2013
69	Alpha Herculis	17 <sup>h</sup> 14 <sup>m</sup> .6	+14° 23'	3.5, 5.4	4.8"	103°	2013
70	Delta Herculis	17 <sup>h</sup> 15 <sup>m</sup> .0	+24° 50'	3.1, 8.3	12.4"	289°	2013
71	36 Ophiuchi	17 <sup>h</sup> 15 <sup>m</sup> .3	-26° 36'	5.1, 5.1	4.9"	142°	2012
72	Omicron Ophiuchi	17 <sup>h</sup> 18 <sup>m</sup> .0	-24° 17'	5.2, 6.6	10.0"	355°	2013
73	Rho Herculis	17 <sup>h</sup> 23 <sup>m</sup> .7	+37° 09'	4.5, 5.4	4.1"	319°	2013
74	Nu Draconis	17 <sup>h</sup> 32 <sup>m</sup> .2	+55° 11'	4.9, 4.9	62"	311°	2012
75	Psi Draconis	17 <sup>h</sup> 41 <sup>m</sup> .9	+72° 09'	4.6, 5.6	30.0"	16°	2013
76	40/41 Draconis	18 <sup>h</sup> 00 <sup>m</sup> .2	+80° 00'	5.7, 6.0	18.7"	231°	2013
77	95 Herculis	18 <sup>h</sup> 01 <sup>m</sup> .5	+21° 36'	4.9, 5.2	6.2"	257°	2013



# DEEP SKY WONDERS

For July  
Evening Skies

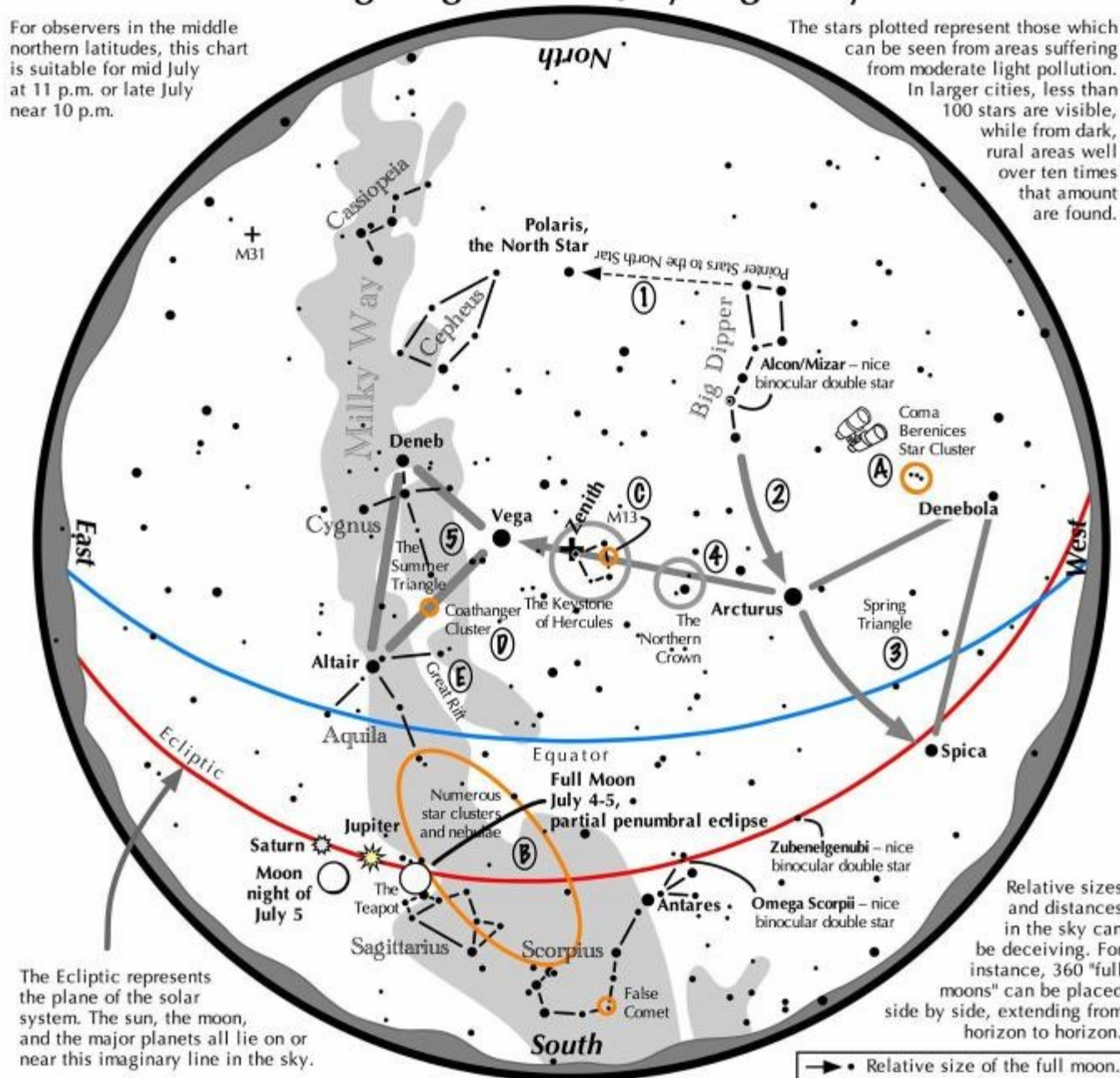
Name	RA (J2000)	Dec (J2000)	Mag.	A.S., '	S.B.	Transit	Type
M 106	12h18m57.6s	+47°18'13.4"	8.60	25.800	13.66	18h38m	galaxy
M 49	12h29m46.8s	+8°00'01.5"	8.63	18.500	13.19	18h49m	galaxy
M 87 (Virgo Galaxy)	12h30m49.4s	+12°23'28.0"	8.92	14.000	12.89	18h50m	galaxy
M 104 (Sombrero Galaxy)	12h39m59.4s	-11°37'23.0"	8.66	12.200	12.11	18h59m	galaxy
M 94 (Croc's Eye Galaxy)	12h50m53.2s	+41°07'12.5"	8.42	20.300	13.18	19h10m	galaxy
M 64 (Black Eye Galaxy)	12h56m43.7s	+21°40'57.6"	8.74	15.838	12.82	19h16m	galaxy
M 53	13h12m55.3s	+18°10'05.4"	7.91	13.000	13.22	19h32m	globular star cluster
M 63 (Sunflower Galaxy)	13h15m49.3s	+42°01'45.4"	8.76	19.800	13.39	19h35m	galaxy
M 51 (Whirlpool Galaxy)	13h29m52.7s	+47°11'42.9"	8.26	18.100	12.72	19h49m	galaxy
M 83 (Southern Pinwheel Galaxy)	13h37m00.9s	-29°51'56.7"	8.80	24.400	13.97	19h57m	galaxy
M 3	13h42m11.6s	+28°22'38.2"	6.37	18.000	12.39	20h02m	globular star cluster
M 101 (Pinwheel Galaxy)	14h03m12.6s	+54°20'55.5"	8.01	55.700	14.97	20h23m	galaxy
NGC 5897 (Ghost Globular Cluster)	15h17m24.4s	-21°00'36.4"	8.84	6.000	12.47	21h37m	globular star cluster
M 5 (Rose Cluster)	15h18m33.2s	+2°04'51.7"	6.83	23.000	13.38	21h38m	globular star cluster
M 80	16h17m02.4s	-22°58'33.9"	8.18	10.000	12.92	22h37m	globular star cluster
M 4 (Crab Globular Cluster)	16h23m35.2s	-26°31'32.7"	6.25	26.000	13.06	22h44m	globular star cluster
NGC 6169 ( $\mu$ Normae Cluster)	16h34m06.7s	-44°00'57.6"	8.07	12.000	13.20	22h55m	open star cluster
M 13 (Star Cluster in Hercules)	16h41m41.6s	+36°27'40.7"	5.93	27.910	11.17	23h01m	globular star cluster
M 12	16h47m14.2s	-1°56'54.7"	7.86	16.000	13.62	23h07m	globular star cluster
NGC 6231 (False Comet Nebula)	16h54m08.5s	-41°49'36.0"	3.64	15.000	9.26	23h15m	open star cluster
IC 4628 (Prawn Nebula)	16h56m54.7s	-40°30'44.4"	7.99	50.000	14.57	23h17m	cluster / nebulosity
M 10	16h57m09.1s	-4°06'01.1"	6.59	20.000	12.83	23h17m	globular star cluster
M 62 (Flickering Globular Cluster)	17h01m12.6s	-30°06'44.5"	7.80	15.000	13.42	23h22m	globular star cluster
M 19	17h02m37.7s	-26°16'04.6"	7.81	17.000	13.70	23h23m	globular star cluster
NGC 6281 (Moth Wing Cluster)	17h04m41.0s	-37°59'06.0"	6.09	9.000	10.60	23h25m	cluster / nebulosity
M 92	17h17m07.4s	+43°08'09.4"	6.53	14.000	12.00	23h37m	globular star cluster
M 9	17h19m11.8s	-18°30'58.5"	8.68	12.000	13.82	23h40m	globular star cluster
M 14	17h37m36.2s	-3°14'45.3"	8.51	11.000	13.45	23h58m	globular star cluster
M 6 (Butterfly Cluster)	17h40m19.9s	-32°15'10.8"	4.68	25.000	11.41	0h01m	open star cluster
IC 4665 (Summer Beehive Cluster)	17h46m18.0s	+5°43'01.2"	4.36	70.000	13.33	0h07m	open star cluster
NGC 6441 (Silver Nugget Cluster)	17h50m13.1s	-37°03'05.2"	8.70	1.500	9.31	0h11m	globular star cluster
NGC 6451 (Tom Thumb Cluster)	17h50m41.0s	-30°12'36.0"	8.64	6.000	12.27	0h11m	open star cluster
M 7 (Ptolemy's Cluster)	17h53m51.1s	-34°47'34.8"	3.89	80.000	13.14	0h14m	open star cluster
M 23	17h57m04.1s	-18°59'06.0"	5.78	25.000	12.51	0h18m	open star cluster
NGC 6543 (Cat's Eye Nebula)	17h58m33.4s	+66°37'59.5"	8.25	0.827	6.02	0h18m	planetary nebula
M 20 (Trifid Nebula)	18h02m42.0s	-22°58'19.2"	6.62	40.000	12.87	0h23m	cluster / nebulosity
NGC 6520 (Dead Man's Chest Cluster)	18h03m24.0s	-27°53'16.8"	8.00	5.000	11.23	0h24m	open star cluster
M 8 (Lagoon Nebula)	18h03m37.0s	-24°22'40.8"	6.34	130.000	14.97	0h24m	HII region
M 21 (Webb's Cross)	18h04m13.0s	-22°29'24.0"	6.22	16.000	11.98	0h25m	open star cluster
M 24 (Small Sagittarius Star Cloud)	18h16m48.0s	-18°33'00.0"	4.89	150.000	13.95	0h37m	star cluster
M 16 (Eagle Nebula)	18h18m48.0s	-13°48'25.2"	6.25	145.000	14.68	0h39m	cluster / nebulosity
M 18 (Black Swan Cluster)	18h19m58.1s	-17°06'07.2"	7.17	7.000	11.14	0h41m	open star cluster
M 17 (Omega Nebula)	18h20m47.1s	-16°10'19.2"	6.27	70.000	13.70	0h41m	cluster / nebulosity
M 28	18h24m32.9s	-24°52'11.4"	8.03	11.200	13.01	0h45m	globular star cluster
NGC 6633 (Tweedledum Cluster)	18h27m31.2s	+6°34'12.0"	4.77	20.000	11.01	0h48m	open star cluster
M 69	18h31m23.1s	-32°20'53.1"	8.88	8.100	13.16	0h52m	globular star cluster
M 25	18h31m47.1s	-19°07'01.2"	4.90	26.000	11.71	0h52m	open star cluster
M 22 (Great Sagittarius Cluster)	18h36m23.9s	-23°54'17.1"	5.47	32.000	12.73	0h57m	globular star cluster
M 81 (Bode's Galaxy)	9h55m33.2s	+69°03'55.1"	7.18	41.000	13.36	16h15m	galaxy
M 82 (Cigar Galaxy)	9h55m52.4s	+69°40'46.9"	8.64	15.500	12.59	16h16m	galaxy

\* Data from Stellarium

# Navigating the mid July Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid July at 11 p.m. or late July near 10 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.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

## Navigating the mid July 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 Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the July evening sky, then continues to Spica.
- 3 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
- 4 To the northeast of Arcturus shines another star of similar 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.
- 5 High in the East lies the Summer Triangle stars of Vega, Altair, and Deneb.

### Binocular Highlights

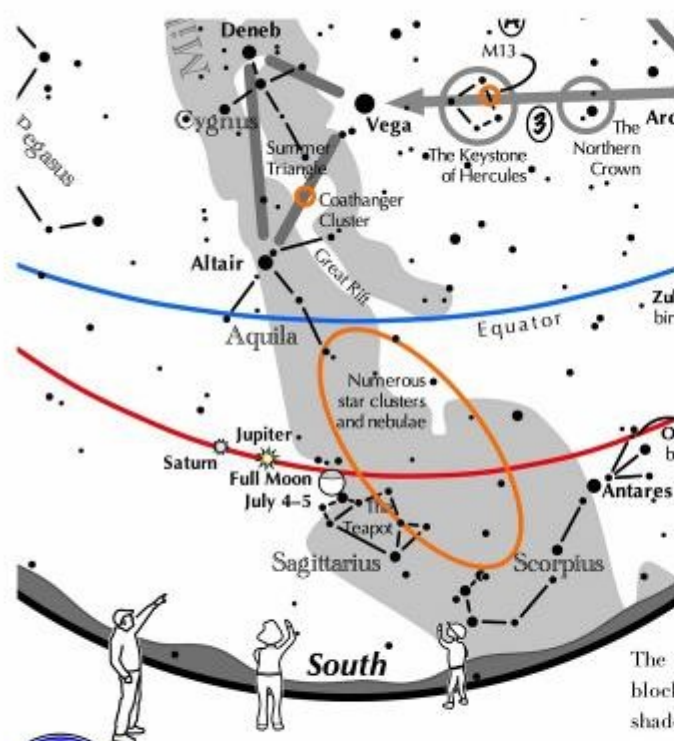
- A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
- B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
- C: On the western side of the Keystone glows the Great Hercules Cluster, containing nearly 1 million stars.
- D: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
- E: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.

Astronomical League [www.astroleague.org/outreach](http://www.astroleague.org/outreach); duplication is allowed and encouraged for all free distribution.

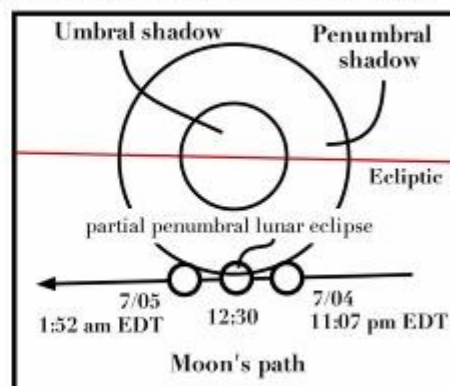




If you have a clear southern horizon on the night of July 4, try this challenge:



View to the south from July 4 at 11 pm  
through July 5 at 2 am EDT



### The Moon slides through a partial penumbral eclipse

Two weeks after a solar eclipse, a lunar eclipse often occurs. June 20 saw a partial solar eclipse and on the night of July 4, a lunar eclipse follows. But it will be an unusual event in that it will be a partial penumbral eclipse.

The penumbral shadow is caused by an opaque body not blocking all the light from an illuminating body. As a result, the shadow isn't completely dark, only partially so. In this case, the opaque body is the Earth, the illuminating source is the sun.

On July 5 at 12:30 a.m. EDT, the penumbral shadow covers only the northern 1/3 of the lunar disk. It may not be an obvious sight. Can you spot it?

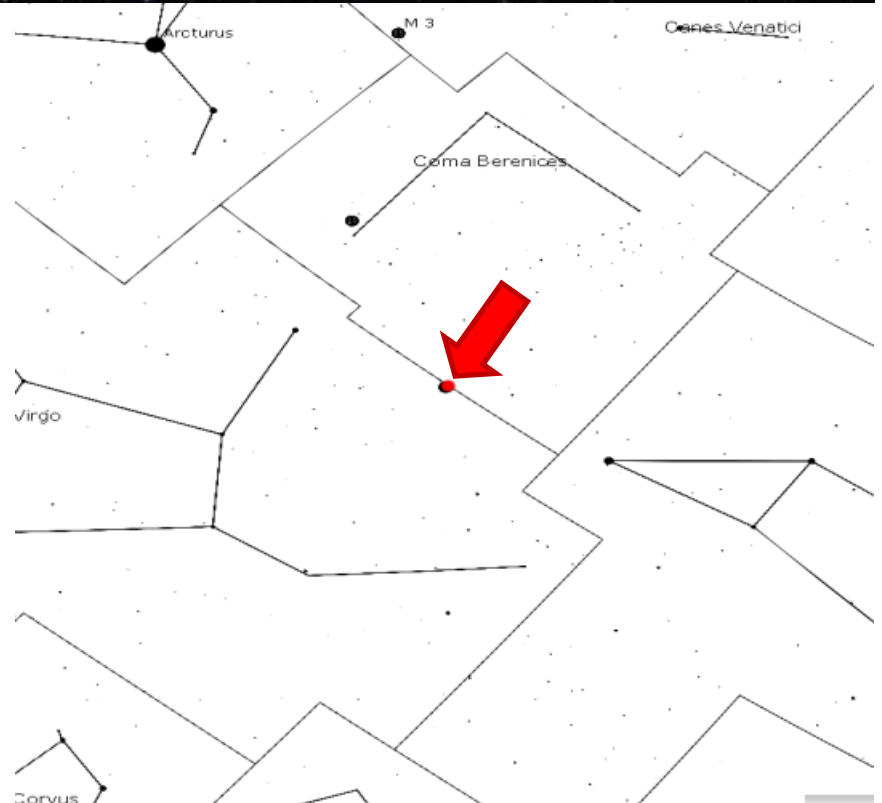
### Ephemeris for C/2020 F3 (NEOWISE)

Date	Moon age	RA	Dec	Rise	Culm	Mag Est	Observable
2020 Jul 2	11 days	05h55m42s	+27°43'29"	4:23	12:18	-0.4	Not observable
2020 Jul 3	12 days	05h57m08s	+29°17'21"	4:12	12:15	-0.5	Not observable
2020 Jul 4	13 days	05h59m13s	+30°53'18"	4:01	12:13	-0.5	Not observable
2020 Jul 5	14 days	06h02m07s	+32°30'38"	3:51	12:12	-0.4	05:00 until 05:06
2020 Jul 6	15 days	06h05m56s	+34°08'40"	3:40	12:12	-0.2	04:55 until 05:05
2020 Jul 7	16 days	06h10m47s	+35°46'39"	3:30	12:13	0	04:51 until 05:02
2020 Jul 8	17 days	06h16m48s	+37°23'49"	3:20	12:15	0.3	04:49 until 04:59
2020 Jul 9	18 days	06h24m06s	+38°59'25"	3:10	12:19	0.6	04:48 until 04:56
2020 Jul 10	19 days	06h32m45s	+40°32'34"	3:00	12:23	0.9	04:49 until 04:53
2020 Jul 11	20 days	06h42m54s	+42°02'15"	2:51	12:30	1.2	Not observable
2020 Jul 12	21 days	06h54m37s	+43°27'14"	2:41	12:37	1.5	Not observable

NE July 4, 2020  
5 AM

# Spotlight: NGC 4435/4438– The Eyes

- The Eyes Galaxies (NGC 4435 -NGC 4438, also known as Arp 120) are a pair of galaxies about 52 million light-years away in the constellation Virgo
- The pair are members of the string of galaxies known as Markarian's Chain.
- NGC 4435 is a barred lenticular galaxy currently interacting with NGC 4438
- Studies of the galaxy by the Spitzer Space Telescope revealed a relatively young (190 million years) stellar population within the galaxy's nucleus, which may have originated through the interaction with NGC 4438 compressing gas and dust in that region, triggering a starburst.
- It also appears to have a long tidal tail possibly caused by the interaction; however, other studies suggest the apparent tail is actually foreground galactic cirrus within the Milky Way unrelated to NGC 4435.
- Gravitational tides from collisions are probably responsible for ripping away the contents of NGC 4438, and for reducing NGC 4435's mass and removing most of its gas and dust.
- Given the high density of galaxies in the center of the Virgo galaxy cluster, it is possible that the three galaxies, NGC 4435, NGC 4438, and M86, have had past interactions.







**This article is distributed by NASA Night Sky Network**

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## Mars's Latest Visitor: NASA's Perseverance Rover

David Prosper

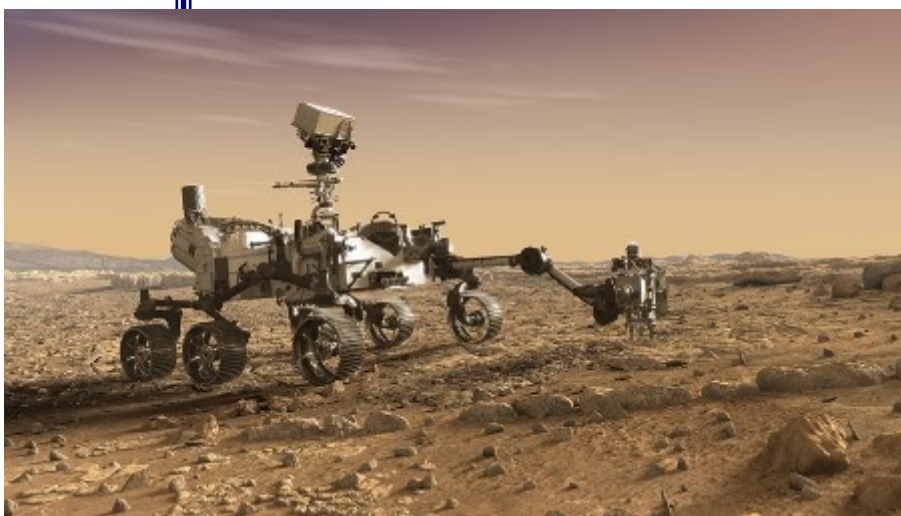
NASA's latest Mars rover, Perseverance, is launching later this month! This amazing robot explorer will scout the surface of Mars for possible signs of ancient life and collect soil samples for return to Earth by future missions. It will even carry the first off-planet helicopter: Ingenuity. Not coincidentally, Perseverance will be on its way to the red planet just as Mars dramatically increases in brightness and visibility to eager stargazers as our planets race towards their closest approach in October of this year.

Perseverance's engineers built upon the success of its engineering cousin, Curiosity, and its design features many unique upgrades for a new science mission! In February of 2021, Perseverance will land at the site of an ancient river delta inside of Jezero Crater and ready its suite of seven primary scientific instruments. The rover will search for traces of past life, including possible Martian fossils, with WATSON and SHERLOC, two advanced cameras capable of seeing tiny details. The rover also carries an amazing instrument, SuperCam, to blast rocks and soil outside of the rover's reach with lasers to determine their chemical makeup with its onboard suite of cameras and spectrometers. Perseverance will also take core samples of some of the most promising rocks and soil, storing them for later study with its unique caching system. Future mis-

sions will retrieve these samples from the rover and return them for detailed study by scientists on Earth. Perseverance also carries two microphones so we can hear the sounds of Mars and the noises of its instruments at work. It will even launch a small helicopter - Ingenuity - into the Martian atmosphere as a trial for future aerial exploration!

Would you like to contribute to Mars mission science? You can help NASA's rover drivers safely navigate the Martian surface by contributing to the AI4Mars project! Use this tool to label terrain features on photos taken of the Martian surface by NASA missions to help train an artificial intelligence algorithm to better read their

*(continued on next page)*



*Perseverance inspects a cluster of interesting Martian rocks with its instruments in this artist rendering by NASA JPL/Caltech*

*(continued in next column)*

## NASA Space Place Partner Article

July 2020

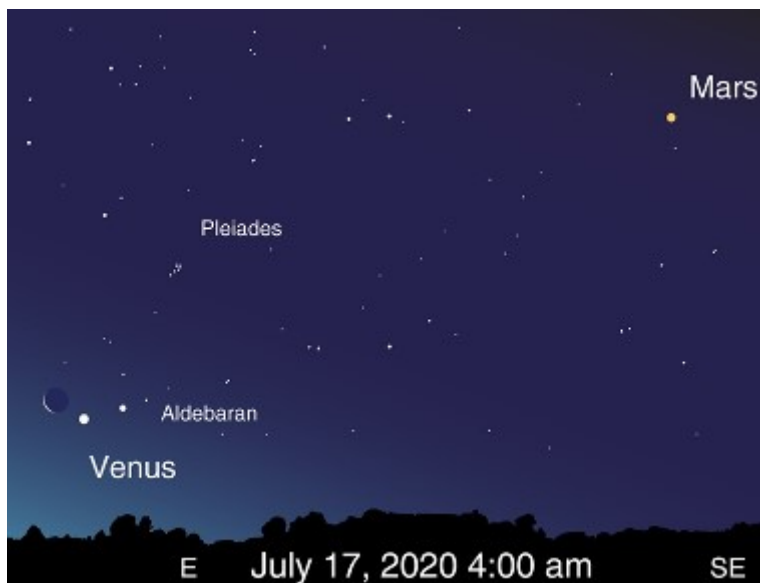


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**Mars's Latest Visitor: NASA's  
Perseverance Rover**  
David Prosper

surrounding landscape: [bit.ly/AI4Mars](https://bit.ly/AI4Mars)

The launch of Mars Perseverance is, as of this writing, scheduled for July 20, 2020 at 9:15am EDT. More details, updates, and livestreams of the event are available on NASA's official launch page: [bit.ly/Mars2020Launch](https://bit.ly/Mars2020Launch). Dig deep into the science of the Mars 2020 mission and the Perseverance rover at: [mars.nasa.gov/mars2020/](https://mars.nasa.gov/mars2020/). Find out even more about past, present, and future Mars missions at [nasa.gov](https://nasa.gov).



*Observe Mars yourself over the next few months! Mars can be found in early morning skies throughout July, and by the end of the month will rise before midnight. Mars gradually brightens every night until the close approach of Mars in October. The pre-dawn skies of July 17 present an especially nice view, as the waning crescent Moon will appear near Venus and Aldebaran.*

## NEWS & LINKS

### A 2nd Planet has been Confirmed for Proxima Centauri

June 12th, 2020



### Scientists are much better at predicting when the Sun is going to become more active

June 15th, 2020:





## **Chicxulub collision put Earth's crust in hot water for over a million years**

June 1st, 2020



## **A weird cosmic flare called the 'Cow' now has company**

June 1st, 2020



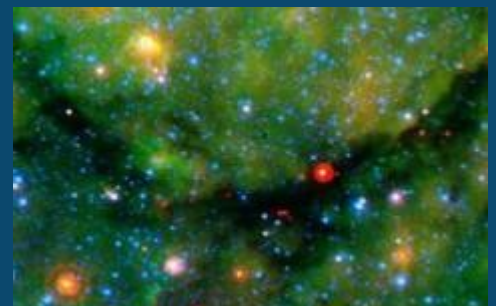
## **Chance of finding young Earth-like planets higher than previously thought**

June 5th, 2020:



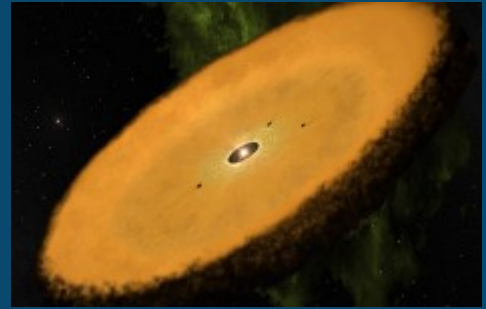
## **A new catalog of infrared dark clouds**

June 5th, 2020



## Astronomers discover how long-lived Peter Pan discs evolve

June 10th, 2020



## Black hole model reveals star collapse without bright explosion

June 11th, 2020



## How four newborn exoplanets get cooked by their sun

June 11th, 2020



## Astronomers discover Huge Circular Arc Near The Big Dipper

June 16th, 2020





# MEMBER OBSERVATIONS

## Lunar Observations

By Ken Boquist

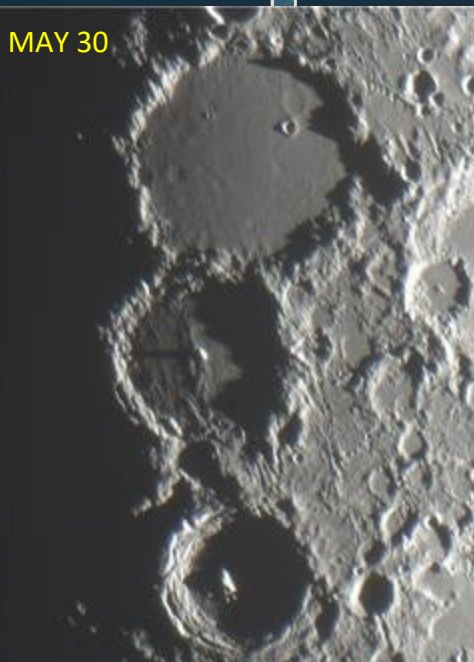
Here are two pictures (lower right) of one of the most well-known areas of the moon showing the craters Ptolemaeus, Alphonsus, and Arzachel (the three most prominent craters visible in the pictures, from top to bottom). These two pictures were taken 22h 20m apart, the first one on 30 May 2020 at 3:47 UT, and the second one on 31 May 2020 at 2:07 UT. They were taken with a 9.25" Schmidt-Cassegrain operating at f/20. Both of these pictures are stacked and processed images using the best 25% of 1,000 frames using Autostakert and Registax. The seeing was somewhat better on the 31<sup>st</sup>, but much of the difference in sharpness between the two still stems from some inexplicable problems I kept having processing the pictures taken on the 30<sup>th</sup>. Nevertheless, some interesting information can be found in both pictures. The pictures also show just how much appearances can change on the moon in just one day. They also show that while conventional wisdom has it that the best time to view a crater is at its sunrise or sunset times, fantastic views can also be seen when the sun is a little higher in the sky. In fact, my experience over the years has shown that in many ways, one really needs to follow a crater's appearance over several days to get a good sense of the crater's features. So, I'll talk a little bit about each

*(continued in next column)*

crater.

Ptolemaeus: The 30 May picture does a very good job of showing what is arguably Ptolemaeus' most famous feature. These are the little "dimples" or "saucers" that can be seen on its floor. These dimples are fleeting in appearance. They can only be seen when the sun is very low on the lunar surface. As the second picture shows, they are nearly, or completely, invisible less than a day after sunrise on Ptolemaeus. According to Charles Wood's book "The Modern Moon", the general consensus is that the dimples are simply buried craters. What is not known for sure is whether the features are buried by lava, or ejecta from the Mare Imbrium basin formation. There is some evidence that most likely much of the floor of Ptolemaeus is covered by Imbrium ejecta rather than lava. Ptolemaeus is about 92 miles wide, and about 1.4 miles deep.

*(continued on next page)*



# MEMBER OBSERVATIONS

**Alphonsus:** The two pictures (previous page) show some very real differences in appearance. The 30 May picture shows that the west half of the floor (the floor to the left of the peak) is fairly rough, while what little of the eastern half of the floor that can be seen seems to be a little smoother. When the sun gets a little higher, this appearance seems to disappear as can be seen in the picture taken on the 31<sup>st</sup>. However, other features come into visibility. If one looks carefully, one can see several dark spots near the edges of Alphonsus's floor. In particular, the ones on the east side (the right side of Alphonsus) all have small craters in them and some pictures show these craters to rise up slightly. This is one of the few cases where it is believed that volcanism was present on the moon. Charles Woods' book states that the dark patches are almost certainly deposits of ash that erupted from volcanoes. Also visible on the floor are several rilles, which are the long, somewhat meandering channels. The most prominent of these was visible on the 31<sup>st</sup> in my telescope visually, but it wasn't easy. Alphonsus is also famous as the site of controversial observations by Dinsmore Alter and Nikolai Kozyrev in the 1950's that led them to conclude that volcanic gas was still being erupted. Alphonsus is about 71 miles in diameter.

**Arzachel:** Arzachel is a beautiful Tycho-like crater with nice, well formed terraces on its inner walls. It also features an offset central peak, and a nice rille meandering on the floor roughly parallel to Arzachel's eastern wall. The rille could be seen visually on the 31<sup>st</sup> through my telescope, but not as well as seen here. Arzachel is about 60 miles in diameter.

*(continued in next column)*

**Alpetragius:** Nestled in between Alphonsus and Arzachel is Alpetragius (see the small crater just down and slightly left of Alphonsus. Alpetragius is one of the most unusual craters on the moon. It doesn't have a flat floor, and it has a very large central peak that looks more like an egg! To me, this is the only real feature of note for Alpetragius, but this unusual appearance has always caught my eye. I have yet to find anything else like this on the moon!

**Rupes Recta ("Straight Wall"):** This picture (below) was taken on 31 May 2020 at 2:15 UT with a 9.25" Schmidt-Cassegrain operating at f/20. It is a stack of the 25% best images out of 1,000 frames. The straight wall is showing up very nicely. The crater to its left is Birt, and just to Birt's left and running to the upper left is Rima (rille) Birt. The Straight wall is about 66 miles long, and about 800 to 1,000 feet in height. Although the picture makes it look like it is a steep feature, its slope is actually fairly moderate.



*(continued on next page)*



# MEMBER OBSERVATIONS

Archimedes: This picture (below) was taken on 31 May 2020 at 2:20 UT with a 9.25" Schmidt-Cassegrain operating at f/20. It is a stack of the 25% best images out of 1,000 frames. The most prominent crater in this picture is Archimedes. The floor of Archimedes itself is not particularly remarkable, although some signs of variations in dark and light are visible on it. What has always fascinated me is the "wreath" surrounding it. It shows nice terracing and even on the south side, a tiny narrow "valley" running roughly parallel to the rim. Archimedes is about 50 miles in diameter. The prominent crater to its upper right is Autolycus. It is about 23 miles in diameter.



The Archimedes region is fascinating due to the variety of landforms and features visible. Flat mare ("seas") areas are prominent, along with hilly terrain here and there. The jagged "sawtooth" like feature running from center bottom of the picture to nearly the top on the right edge is the Apennine

*(continued in next column)*

Mountains. Only a portion of this mountain chain is visible in this picture. Also visible throughout much of the right half of the picture are little channels called rilles. Incidentally, two spacecraft have landed in this region, Luna 2 (USSR) and Apollo 15 (USA). I have marked their location with "X"s. Luna 2 is just to the lower left of Autolycus, while Apollo 15 is nestled up against the Apennine Mountains straight right of Archimedes.



*Editors Note: The Vallis Alpes (above) is a lunar valley feature that bisects the Montes Alpes range. It extends 166 km from the Mare Imbrium basin, trending east-northeast to the edge of the Mare Frigoris. The valley is narrow at both ends and widens to a maximum width of about 10 km along the middle stretch. This photo also one of Ken Boquist's Photos*



# MEMBER OBSERVATIONS



*Photo of the Crescent Nebula (NGC 6888) by Matt Neilssen  
Taken from the deck.  
Lights 15x4 min @ISO 400 with L-eNhance  
Darks, Flats, Bias  
Canon 60D  
Orion 8" Astrograph*



*M 16 , The Eagle Nebula by Byron Davies June 11th, 2020 . 120 sec exposure, 1600 iso*



*NGC 6995, The Bat Nebula by Byron Davies  
June 11th, 2020 . 2440 sec exposure, 1600 iso*



*M17, The Swan or Omega Nebula by Byron Davies June 11th, 2020 . 120 sec exposure, 1600 iso*



# MEMBER OBSERVATIONS



***M51, The Whirlpool Galaxy by Byron Davies June 11th, 2020 . 180 sec exposure, 1600 iso***



***M13, The Hercules Globular, by Byron Davies June 11th, 2020 . 120 sec exposure, 1600 iso***



***M101, The Pinwheel Galaxy by Byron Davies June 11th, 2020 . 240 sec exposure, 1600 iso***



# MEMBER OBSERVATIONS



*Pickering's Triangle,  
Part of the Cygnus Loop  
Photo by  
Paul Saeger*



*Western Veil ,  
Photo By  
Paul Saeger*



# MEMBER OBSERVATIONS

Some photos that rusty Case got at Paul Castle on June 12th, 2020 with his 11 in Edge telescope and the R2 camera.



M106



M104



M99



M51



M98

# MEMBER OBSERVATIONS

I got a new camera this month. The ZWO ASI294MC camera. It is a deep sky camera. These are some of the first photos taken with it (May 29th, 2020). I really wasn't keeping track of settings too well. Most were 30 sec exposures stacked for 3 minutes. Most of the objects were well away from the 1st quarter Moon. The software used (except the Moon) was ZWO's new software ASI Live which was part of their new (see link) ASI Studio, of which they released new versions the day before. They also have a deep sky software and a planetary software (I used this on the Moon). I am pretty happy with the results and look forward to using it more after the Moon gets out of the way. There is a little post editing in the photos.

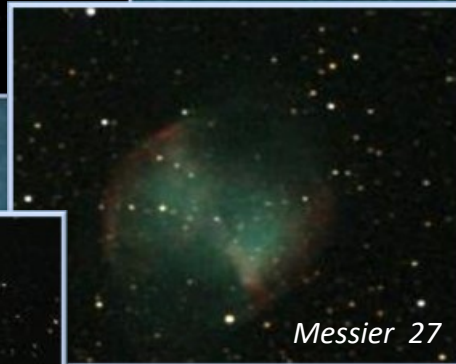
**Terry Dufek**



*Messier 104*



*Messier 57*



*Messier 27*



*Messier 4*



*Messier 5*



# MEMBER OBSERVATIONS

My third outing with my camera was at Menke Observatory on June 14th, 2020. The weather was a little humid with many pesky gnats. The sky was pretty clear though and the temperature dropped off after sunset with a pleasant breeze out of the south east. I got a real good alignment and the tracking was very good. I observed several Messier objects and wrapped up around 1 am. There is a little post editing in the photos.

**Terry Dufek**

M94 , 14– 30 sec frames

M3, 11-30 sec frames

M106, 22-10 sec frames

M20, 46-5 sec frames

M8, 33-5 sec frames

# Paul Castle Observing Sessions

## Paul Castle May 29th, 2020

Last evening a group of us met at the Paul Castle Memorial Observatory to take advantage of a rare event--clear skies! Some of us were attempting to complete the NCRAL Spring Messier List of objects. I am not sure if anyone actually completed the list due to the bright moon which made it very difficult to observe some of the galaxies in that list. We started by viewing the Moon and then the planet Mercury which made a very fine view as it was fairly high in the sky for that diminutive denizen of the inner solar system. Steve Sinksen brought out his recently refurbished Astrophysics 6" F12 refractor, which provided superlative views of the splendid double star Epsilon Lyrae (the Double Double), Zeta Lyrae and Beta Scorpii (Graffias). These optics are really fantastic providing perfect "pin-prick" images of stars. M13 was also really nice in Steve's scope. John Douglas set up his recently acquired 10" dobsonian, which provided a truly amazing image of M13, Zeta Lyrae and Beta Scorpii. Wayland Bauer used the club's new

*(continued in next column)*



Celestron CPC1100. Dale Hachtel set up the club's 7" Meade Maksutov scope and Terry Dufek set up his Celestron SCT and newly acquired deep sky camera, which he used to image M104, M98, M27, M3, M4 and M5. Rusty Case set up his 11" Celestron SCT and R2 Revolution Imager which provided spectacular views of various objects. I was really impressed with the view of M27, The Dumbell Nebula, he displayed on his flat screen TV. Amazing stuff! I set up my 10" Meade LX 200 and shot some images (next page) using my Nikon D7500 camera (photos on next page). The following were my camera settings:

Zeta Lyrae --> FL = 2500mm, 6400 ISO, 5 second exposure time

M3 --> FL = 2500mm, 12800 ISO, 20 second exposure time

M13, M92, M27 --> FL = 2500mm, 12800 ISO, 30 second exposure time

Thanks and keep looking up.

**Al Sheidler**



*(continued on next page)*



# Paul Castle Observing Sessions



*Messier 3*



*Messier 13*



*Messier 27*



*Messier 92*



*Ze/ta Lyrae*



# Paul Castle Observing Sessions

## Paul Castle June 12th, 2020

Last night a group of us met at the Paul Castle Observatory for an evening of observing. In the group photo are Wayland Bauer, Dale Hachtel, Steve Sinksen, Byron Davies, Matt Neilssen, Rusty Case, Terry Dufek, Ken Boquist. and Al Sheidler . This was a really fun and interesting observing session . There was a wide range of different scopes and imaging setups deployed last night delivering superlative views. I believe there were two more of us who completed the NCRAL Spring Messier list of objects.

### Al Sheidler

*Editors Note: The weather was very favorable for viewing last night (June 12th). There a brief rush of humidity as the Sun set and then it fell of quickly. Around midnight, a front came through with a cool steady breeze rising from the north and scattered clouds came in. Some of us left then, as we had to come back the next day for observatory construction. The last to leave around 2:30 am were Matt and Byron. Photos (right) were Al Sheidler and the rest, Matt Neilssen .*



(above) Group photo



(left) Matt Neilssen with his set up



(left) are Matt Neilssen, Byron Davies and Stephen Sinksen telescopes.

(right) are Al Sheidler and Dale Hachtel telescopes





# Paul Castle Observing Sessions

## Al Sheidler Photos from June 12th, 2020

These photos were shot using my Nikon D7500 camera. The photos were taken using a 10" Meade LX200 telescope at 2500mm focal length. The galaxies and globular clusters were 30 second time exposures at ISO 16000. The image of Saturn (though not one of my better shots) was a 5 second exposure at ISO 16000. This was sufficient to bring out some of the larger moons. At that point, my camera battery ran out of juice and since I forgot to bring the spare battery, I had to stop photographing.

Al Sheidler



M102



M9



M5



M13

(continued on next page)



# Paul Castle Observing Sessions

*Al's photos continued.....*

M51



M83



M92





# Paul Castle Observing Sessions

## Terry Dufek Photos from June 12th, 2020

These photos were shot with the Celestron 8 in and a ZWO ASI294 camera at Paul Castle. I used short exposures stacked because I had a problem getting a good alignment. I am happy with the results though.

**Terry Dufek**



M9 162 sec exposure



M51 275 sec exposure Gain 390



M64 305 sec exposure



NGC 4565 180 sec exposure

# Paul Castle Observing Sessions

**Paul Castle June 12th, 2020**

Last evening (June 24/25th), a group of us got together at the Paul Castle Memorial Observatory to do some observing. When we arrived it was very cloudy but like farmers and fishermen, we astronomers are eternal optimists and we decided to set up our telescopes and hope for the best. By the time it got dark around 10:00, it had cleared off for the most part. We did have to dodge some occasional clouds as they passed by, but by midnight it was clear, cool and beautiful. In the group photo are Al Sheidler, Terry Dufek, Rusty Case, Eric Sheidler and Byron Davies.

We started off observing a nice crescent moon and once it got dark enough to find alignment stars, we began seeking objects which were a little more challenging to find. Attached are snapshots of the objects I observed. The Messier objects are from the NCRAL Summer Seasonal Messier List of objects. All of these objects are easily visible right now. All images were taken with a Nikon D7500 SLR camera attached to a 10" Meade LX200. The Messier objects were all captured at a FL of 2500mm, ISO 25600, and 20sec time exposure. The image of the Moon was taken at FL 2500mm, ISO 1600, and 1/1000sec exposure. Saturn and Jupiter were taken with a Barlow lens, providing an effective focal length of 5000mm. The images of Jupiter and Saturn were developed from video frame stacking of 60 seconds of video using Auto-stakkert software. The view of the Jupiter system is actually a composite image, one of the planet itself taken as described above (by stacking video frames) and another overexposed snapshot to bring out the Galilean moons. I then combined the two images to provide something similar to what one sees looking in the eyepiece of the telescope.

All in all, we had a great time dodging clouds and bagging objects! Keep looking up.

**Al Sheidler**



*Editors note: all photos here and on the next page  
are from Al Sheidler (continued on next page)*



# Paul Castle Observing Sessions

M4 Crab Globular

M5

M14

M16 Eagle Nebula

M8 Lagoon

M9

M13

M17 Omega Nebula

M20 Trifid

M22

M54 (Globular belongs to another galaxy)

This page features a wide selection of photos from Al Shidler's Summer Messier Survey which he completed at Paul Castle.

M102 Spindle Galaxy



# Paul Castle Observing Sessions



This page features a selection of photos from Byron Davies at Paul Castle on June 24th, 2020







# PAC MONTHLY MEETING

President Alan Sheidler arranged the June 2020 meeting of the Popular Astronomy Club to be conducted via (Zoom) at 7:00 p.m. local time, on June 8th, 2020. We had 22 members and 0 guests attending.

## The Business Meeting was called to order

- A motion was made and seconded to approve without dissent the previous business meeting notes as published in the April Reflections newsletter.

## Secretary:

- Terry showed a 4X6 design for wall plaques for the walls of the observatory (see page 5). Either space objects or stylized versions of the ecliptic constellations could be used, and it was decided to go with constellations to keep with the originals.

## Treasurer:

- Dale covered the June 5th (see next page) treasurer's report.
- He also reviewed birdies for charity which is due by June 25th or can be paid online. We had made \$1634 from last year's B4C.
- A motion was made by Gerry to approve the treasurer's report. It was seconded and approved by the majority without dissent.

## Director of Observatories:

- Rusty stated that the PACMO was ready to go if and whenever the covid restrictions were lifted.
- On June 6th, Rusty had ran new electric to the platform base of the observatory.
- He had contacted Home Dome and they will honor the 2019 price estimate.
- A motion was made to approve the order and disbursement of funds. It was approved by the majority without dissent.

*(continued in next column)*

- Rusty, along with Dale are going to order the dome opener which will be shipped to Rusty home.'
- The deck and walls are tentatively scheduled to be put up on June 13th at 10 am.
- Terry is going to construct a dew shield for the new telescope.

## Vice President:

- Dino covered proposed safety guidelines for public viewing sessions when they become doable in the future.
- Al is going to run them by Carl Wenning

Ann brought up about an emergency contact list for members if something happens when out on an event. Al said that we will bring it up for discussion in the future.

A motion was made to adjourn the business meeting by Wayland and seconded by Rusty. It was approved by the majority with no dissent.

## Potpourri Presentations:

- Terry did a presentation on Wolfe-Rayet stars
- Terry showed a low cost dew shield for the Telrad finder.
- Dino showed an XYZ cell phone holder that attaches to telescopes and lines up for photo shots.
- Byron Davies photos were presented including the Crescent Nebula.
- Terry Dufek had some photos shown with his new camera.
- Al Sheidler showed photos taken on June 6th of the pier construction at the observatory.

The Zoom meeting was adjourned.

6/5/2020

**TREASURERS REPORT**

from 3/1/2020 to 5/31/2020

description	current period detail	current	YTD
<b>Receipts:</b>			
memberships	1 renewal	\$30.00	\$120.00
member donations			
program donations			
misc donations	Nelson Charitable Fund	\$1,630.75	\$1,630.75
interest		\$0.95	\$1.74
banquets			
birdies			
calendars			
special			
sales			\$700.00
other			\$30.00
Total Receipts		\$1,661.70	\$2,482.49

<b>Expenditures:</b>			
programs			
speakers			
PACMO operation	rent for storage	\$240.00	\$240.00
observatory			\$301.00
equipment			
maintenance			
Astronomical League			
insurance			
operating supplies			
newsletter			
web page			
banquet	reserved for 10/24/20	\$100.00	\$100.00
donations			
miscellaneous			\$100.00
Legal			
PACMO upgrade			
observatory upgrade	telescope, hardware, wood	\$4,746.02	\$4,746.02
other			
adjustments			
Total Expenditures		\$5,086.02	\$5,487.02

<b>Balances</b>	as of 5/31/2020		
previous balance		\$14,403.11	\$13,983.32
net change		-\$3,424.32	-\$3,004.53
ending balance		\$10,978.79	\$10,978.79

check account			\$1,308.78
money market account			\$9,614.34
savings account			\$10.23
business special			\$45.44
cash			\$0.00
undeposited checks			\$0.00
Total Cash Assets			\$10,978.79

