



Reflections

The Newsletter of the Popular Astronomy Club



JANUARY 2020

President's Corner JANUARY 2020



Alan Sheidler

Welcome to another edition of "Reflections", the universe's best astronomy newsletter. The holidays have been a time of devotion to family and probably a time of reflection. For amateur astronomers, this might be the "off season", a time of rest and recuperation or perhaps thoughts of perhaps buying a new telescope

(unless Santa brought you that new scope). In any event, here we are at the beginning of another new year. It's hard to believe it is 2020. But here we are. Your club will celebrate its 84th birthday this year and continues to be one of the most active members of the Astronomical League. I would encourage you all to participate in one of the many Astronomical League observing programs or to make a New Year's resolution to participate in one of the NCRAL Seasonal Messier Mini Marathons. At the moment, your club is endeavoring to complete the Winter Messier list of 27 objects. On December 21, we had an observing session at the Paul Castle Memorial Observatory to observe these 27 Messier objects listed on page 9 of this newsletter. I think one of us (Rusty?) actually managed to observe all 27 of the objects. If so, congratulations! The rest of us succumbed to the cold and quit before some of the objects rose high enough to be observed. Don't worry though, we will make another attempt in January or February. Keep up with your email. We will let you know when we will make another attempt. I encourage you to participate. This is a great way for you to learn about deep sky objects and have fun while doing it in a friendly club environment.

(Continued in next column)

Meanwhile, I was also intrigued by NASA's Parker Solar Probe, about which you can read here. This probe was launched in 2018 and has maneuvered with the planet Venus to tweak its orbit to allow it to make close approaches to the sun. The mission plan calls for seven Venus flybys, each of which results in progressively lower perihelia (closer approaches) to the sun. The goal is to orbit to within 3.83 million miles of the sun's surface and make observations of the sun at unprecedented close distances. I was amazed to learn that the Parker probe will be moving at a velocity of 427,200 mph at the lowest point in its orbit and that it will be exposed to temperatures of 1400 deg C during this close approach to our star. I can't help but recall Star Trek episodes where the Enterprise insanely accelerates toward the sun and then at the last second veers off (in a high G-force maneuver) to initiate a time warp either to the 20th century or back to the 23rd century (depending on the Hollywood plot device required). In any event, the Parker Probe is definitely "going where no man has gone before" at speeds and temperatures which are hard to imagine. Happy New Year and keep looking up!

Al Sheidler

2020

Happy New Year!

**From the
Popular
Astronomy Club**



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ANNOUNCEMENTS / INFO

LOOKING FOR OLDER
ISSUES OF REFLECTIONS
NEWSLETTER?

Click [HERE](#)

HISTORY OF PAC?

Click [HERE](#)

Popular Astronomy Club
on Facebook?

Click [HERE](#)

**READY FOR
MEMBERSHIP
OR TO RENEW?**

Click [Here](#)



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!

Thank you For Renewing

Joel Carter
Michael and Helen Haney
Paul Levesque
Frank Stonestreet
John Weber

Parker Solar Probe



NASA's Parker Solar Probe Sheds New Light on the Sun

Story Link [HERE](#)

Contribution from Mike Mack



NORTHERN LIGHTS



**EMAIL HERE TO
SUBSCRIBE**

Do you subscribe to the Northern Lights newsletter? It is free and full of information on what is going on in the North Central Region (NCRAL) Click on link above to subscribe by email and receive monthly! (Click [HERE](#) to see latest issue)

ANNOUNCEMENTS / INFO

ALCON 2020

Save the Date! ALCON 2020 will be held in Albuquerque, NM, July 16 – 18.

The conference is hosted by The Albuquerque Astronomical Society (TAAS), and we are excited to welcome the astronomical community to Albuquerque. Attached is a flyer & information package for event. Both can be found at the bottom of our website: <http://taas.org/> Check back frequently for updates.

Yes, it's early, but I wanted to share this information with you.

Diana L Case, TAAS
(505) 269-1720



*Contribution from
Roy Gustafson*

<https://texasstarparty.org/account/>

Find the latest news at:

<https://texasstarparty.org/news/>

We have a NEW Texas Imaging Workshops, where you can learn more about imaging from our experts during TSP!

<https://texasstarparty.org/tsp-imaging-workshops/>

Questions? Visit our web site for the latest and complete details!

<https://texasstarparty.org/> or email tsprooms@texasstarparty.org

We look forward to seeing you next May!

Sincerely,
the volunteers for Texas Star Party
Unsubscribe from future TSP invitations at:
https://texasstarparty.org/opt-email-tsp-invitations/?email=%%user.user_email%%

Contribution from Jeff Struve



2020 Texas Star Party – Sign up now!

The great tradition of dark sky observing continues with the 42nd Annual

TEXAS STAR PARTY, May 17-24, 2020!

near Ft Davis, Texas

Staying on the Ranch in housing, RV, or camping? Staying off-site in other accommodations? Everyone needs to enter the TSP drawing, held in late January.

You should submit a Registration/Reservation Request Form to ENTER THE TSP DRAWING before January 17, 2020.

This will provide you the highest possible chance of being selected as one of the 500 people who will be able to attend TSP this year.

Follow this link to get started!

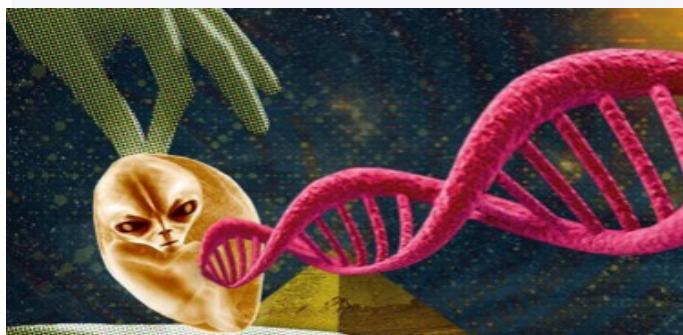
<https://texasstarparty.org/get-started/>

SIGN UP NOW!

You can find out the status of your TSP Registration at any time by visiting

(Continued in next column)

CONTRIBUTIONS



LONELY PLANETS

Astronomers and planetary scientists debate if and when we'll find extraterrestrial life! Link [HERE](#)

Contribution from Mike Mack

CONTRIBUTIONS



Astronomy shared a post to the group:
Telescope Addicts - Astronomy &
Astrophotography Community.
7 mins · 🌐

Like Page ***

Only an astronomer knows the feeling. 😊

Credits: StarToons



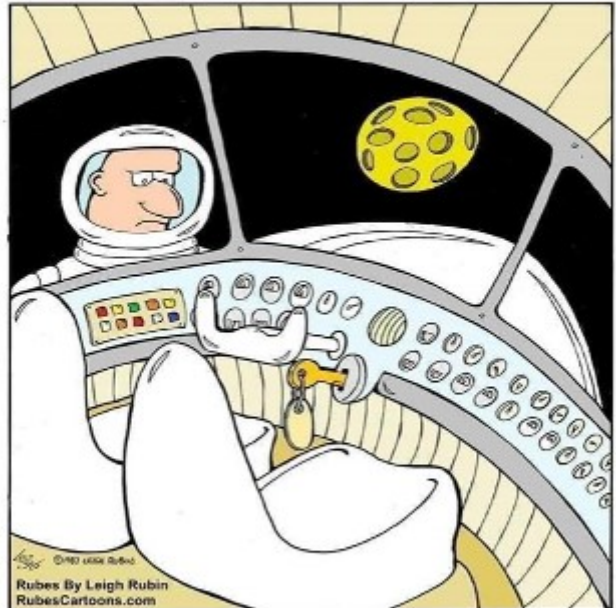
👍 😊 🍷 16

1 Comment



Michael McDonald ▸ Telescope Addicts - Astronomy &
Astrophotography Community
13 hrs · 🌐

I wonder if NASA has considered this conundrum?!! 😊



👍 🗨️ 😊 You and 110 others

17 Comments

😂 Haha

Comment



Popular Astronomy Club, Inc. - Quad Cities
Published by Terry Dufek · 🌐 · 28 mins · 🌐



Angel Rojas
October 16 at 12:29 PM

Perfect lamp doesn't exl...

CONTRIBUTIONS



Make a Moon Phases Calendar and Calculator - New for 2020



Jet Propulsion Laboratory
California Institute of Technology



Now updated for 2020!
See How To Do It Here!

Contributed from Roy Gustafson



AWARDS



Award presented to Ken Boquist



Al presented an **Astronomical Award of achievement** to Ken Boquist (left) at the December 9th meeting for completing the **Asterism Observing Program** for observing 100 asterisms.

It should be noted that Ken has now completed 19 Astronomical League Observing Programs and is a qualified master observer!



Ken Boquist receiving his Astronomical League Award from President Al Sheidler for completing

Information on the
**Asterism
Observing Program**
[HERE](#)



Updated 10-5-2019

Work is progressing steadily for the NCRAL 2020 Convention themed Vision 2020. The convention will be held Friday/Saturday, May 1-2, 2020, at the Lakeview Conference Center attached to the Country Inn & Suites in Port Washington, WI. Activities and speakers are being planned for Friday afternoon and all day on Saturday. We are excited to work with a great catering company for the conference meals.

We have a block of rooms at the conference hotel reserved for NCRAL Vision 2020 guests. Most are double queen, but some are single king. They are all offered at the same discounted rate of \$109/night (plus tax) based on double occupancy. Additional occupants for these rooms are \$10/night (plus tax). All registered guests will enjoy full use of the hotel facilities, including indoor pool, whirlpool, fitness room, game room, and full hot breakfast each morning. Our block of rooms will be open until April 1, 2020, and is limited in number, so don't delay! Call the Country Inn & Suites in Port Washington, WI at [\(262\) 284-2100](tel:2622842100) and ask for the NCRAL Convention rate. You may also want to peruse the website, which is linked from our conference webpage.

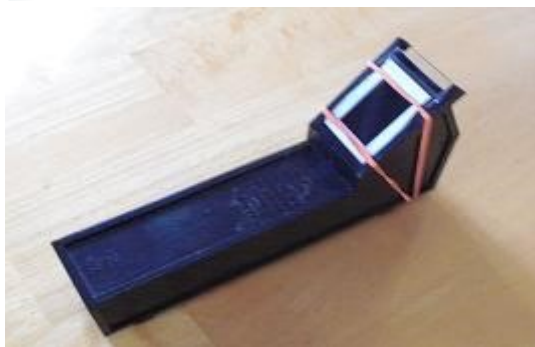
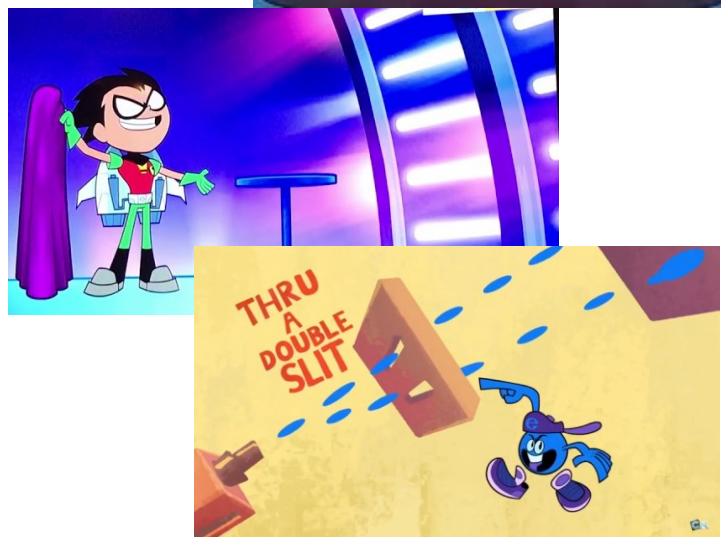
In the coming months, we will be finalizing agenda, speaker and other details, so look for updates on our website: <http://www.ncsf.info>. For now, be sure to SAVE THE DATE, reserve your room, and plan on attending a valuable and highly enjoyable NCRAL convention.

Quantum Physics Explored on Children's television?

While skimming through television one day, I came across a cartoon show that appeared to be channeling the ancient days of **School House Rock!** On the Cartoon Network was a show called Quantum Fun, Geared to 5-12 year old's, The Teen Titans appeared to be covering some aspects of Quantum Physics through demonstration and song. Who is to say educational television isn't completely dead?

https://teen-titans-go.fandom.com/wiki/Quantum_Fun

Quantum Fun
Terry Dufek



Solar Filter for the Telerad Finder

In 2019, I found that trying to line the telescope up to view the Sun was a pain. Lining the sun up with a shadow on the ground was definitely not for me. I came up with this idea when we were approaching the Mercury transit. The sun was going to be low on the horizon at sunrise so shadows on the ground was not an option. I came up with this idea to filter my Telerad finder.

I took an old photo slide, split it apart, and trimmed the slide to fit on the clear plastic. I replaced the phot film with solar film

and then taped the sides shut. I left a little film sticking out the top to cover the rest of the clear plastics. I rubber banded it down because I didn't want it to flip off in the wind. Thanks to Rusty for donating a 2 in square of solar film. Cost was negligible. It works!

Terry Dufek

THE PAUL CASTLE OBSERVATORY RENEWAL PROJECT

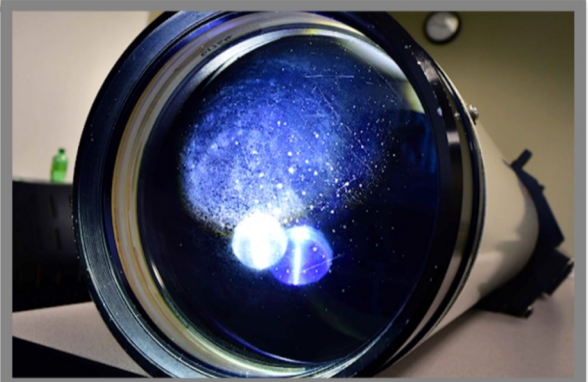
Paul Castle Telescope Removed for Examination

This afternoon (December 15th), Steve Sinksen, Rusty Case, Jeff Struve and I met to examine the Astro-Physics 6" F12 refractor from the Paul Castle Memorial Observatory. The photos (pictured below and right) showing the condition of the scope. Steve spent some time carefully cleaning the front surface of the objective lens. It appears there are also some water spots on the inside surface of the lens, but because we were unsure of the proper method to remove the lens, we did not attempt to remove and clean it. We are going to send pictures to Astro-Physics for any further advice they may have. In the meantime, the scope is in my basement.

Al Sheidler

Another Bid for Dome Renewal

We are in contact with another painter (Chad Ruggeberg from Marine Specialties, LeClaire) who would like to give us a quote for refinishing the dome. We have a tentative date/time of Thursday, December 5th, 3:00pm to meet at the observatory and look things over.





NCRAL WINTER SEASONAL MESSIER MARATHON



Observer: _____

NCRAL Affiliation: _____

Date of Observation: _____

Location: _____

Telescope Used: _____

eyepiece Used: _____

Magnification Used: _____

Field of View: _____

Moon Phase: _____

Seeing: _____

Transparency: _____

Sequence	Messier #	Object Type	Common Name	Constellation	time Observed	Notes
1	M1	PIN	Crab Nebula	Taurus		
2	M45	OCI	Pleiades	Taurus		
3	M36	OCI	Pinwheel Cluster	Auriga		
4	M37	OCI		Auriga		
5	M38	OCI	Starfish Cluster	Auriga		
6	M42	BrN	Orion Nebula	Orion		
7	M43	BrN	De Mairan's Nebula	Orion		
8	M78	BrN		Orion		
9	M79	GCI		Lepus		
10	M35	OCI		Gemini		
11	M41	OCI		Canis Major		
12	M50	OCI		Monoceros		
13	M46	OCI		Puppis		
14	M47	OCI		Puppis		
15	M93	OCI		Puppis		
16	M48	OCI		Hydra		
17	M44	OCI	The Beehive	Cancer		
18	M67	OCI		Cancer		
19	M40	Dbl	Double star	Ursa Major		
20	M81	Gal	Bode's Galaxy	Ursa Major		
21	M82	Gal	Cigar Galaxy	Ursa Major		
22	M97	PIN	Owl Nebula	Ursa Major		
23	M101	Gal	Pinwheel Galaxy	Ursa Major		
24	M108	Gal		Ursa Major		
25	M109	Gal		Ursa Major		
26	M65	Gal	Part of the Leo triplet	Leo		
27	M66	Gal	Part of the Leo triplet	Leo		

*Return to ALCOR upon completion for submission to NCRAL



December 2019

When poetry reaches the stars.

Long, long ago, when I was as student at Acadia University in the Canadian province of Nova Scotia, we studied the poems of Alfred, Lord Tennyson. The English 360 course was taught by one of my favorite professors, Roger Lewis. Tennyson remains one of the truly great English poets, and even in his lifetime he knew that. In 1850, upon the death of William Wordsworth, he was appointed poet laureate by Queen Victoria. In that same year he published *In Memoriam*, arguably his greatest work.

More than a poet, Tennyson enriched his life with a passionate interest in science, particularly the night sky. Did he own a telescope? He surely did. Although he used it often, particularly from his home on the Isle of Wight, he often enjoyed the use of big refractor telescopes in England. He viewed some of the great comets of his time, like Donati in 1858 and Tebutt in 1861. He also noticed the discovery of Neptune in 1846. Not only was he aware of these developments, but he also incorporated them into one of the greatest poems ever written, the epic called *In Memoriam*.

In Memoriam grew out of Tennyson's profound loss when his best friend, Arthur Hallam, died suddenly and unexpectedly in 1831. His grief evolved into several quatrains of poetry, then many, and he completed the work in 1850. But this poem is far more than an elegy. He framed it as a massive commentary on the progress of science during his time, particularly with regard to organic evolution and astronomy. From its dramatic opening line "Strong son of God, immortal love," he delves into what the great telescopes of his time could reveal as "Nature stretches forth her arms, and gleans Her secret from the latest moon?" (CXX)

Passing over his wonderful praise of Darwin's theory of evolution and natural selection...

(Continued in next column)

"And let the ape and tiger die." ... we encounter the epic's truly powerful ending. To write that it is like a bald eagle about to soar in flight is just insufficient. Like a gigantic Saturn 5 as it roars off its launch complex to the Moon, the last two stanzas germinate, then erupt in a fiery tribute to creation itself.

The poem closes with a return to Hallam: "That fiend of mine who lives in God," ... Tennyson then specifies God as being immortal and loving; "That God, which ever lives and loves," ...

And then he defines the Universe as an ordered realm with a specific goal: "One God, one law, one element". In that one line Tennyson summarizes the purpose of *In Memoriam* as a statement about the interplay between science and religion. Finally, Tennyson predicts a goal for the Universe: "and one far-off divine event"



In Tennyson's time that goal was not understood. But a century later, understanding of Hubble's constant opened the great question as to whether the Universe will end in a "big crunch" in which the Universe is condensed into a single point as it was 13.7 billion years ago. The other possibility is that the universe will continue to expand forever. It is one of these two far-off events

"To which the whole creation moves. And thus, we reach the close of *In Memoriam* as it moves proudly among the stars:

That friend of mine, who lives in God,

That God, who ever lives and loves,
One God, one law, one element,
And one far-off divine event,
To which the whole creation moves.

ASTRONOMY IN PRINT

Amateur Astronomy in the Winter Sky

By Dale Hachtel, Popular Astronomy Club

January can be a difficult month for amateur astronomers, with cloudy and snowy skies and cold nights. Most of the planets we enjoyed viewing in the evening during much of 2019 are viewable only briefly in the early morning now, but there are still many interesting objects in the winter sky. Winter is therefore a good time to learn about what's up in the sky besides the familiar constellations, planets, and well-known stars. The Astronomical League (AL) is a non-profit organization that promotes the science of astronomy. The organization does this by fostering astronomical education, providing incentives for astronomical observation and research, and providing incentives for astronomical observation and research and is composed of 240 local amateur astronomical societies.

The North Central Region of the Astronomical League (NCRAL) includes the Quad Cities area, Illinois, and states north and northwest of the Quad Cities and contains 36 of the amateur organizations. At the NCRAL convention in May 2019, hosted by the Popular Astronomy Club (PAC) in Moline, an interesting and educational amateur program was introduced for the NCRAL area. This NCRAL Seasonal Messier Observing Program provides a framework for amateur astronomers to learn about and observe some of the more interesting objects in the sky.

First, a little background about Messier. Charles Messier was a French astronomer who studied comets. Between 1774 and 1781, he compiled a catalog of objects in the sky that could be mistaken for comets. His catalog, with a few 20th century additions, still provides a list of 110 interesting objects for amateur astronomers to find and observe. Some amateur organizations sponsor a Messier Marathon where they try to view

all 110 Messier objects in one night of viewing, but this can usually be scheduled only around the spring and autumn equinoxes.

The program introduced at NCRAL in the Quad Cities, breaks the Messier list into four more easily managed parts, corresponding to a portion of the sky visible in each quarter in the evening sky. These astronomical quarters are defined by the solstices and equinoxes, with the winter quarter being Dec 21 to March 19, followed by the spring, summer and autumn quarters. Viewing each list is considered to be a Messier mini-marathon. A few of the items in each mini-marathon list are visible with the na-



*Picture 2 caption: (DSC_0268 Andromeda Galaxy.jpg)
Messier object M31 is the Andromeda galaxy, the nearest galaxy similar to our Milky Way, and is about 2.5 million light years from the earth. This galaxy is the most distant object that can be seen without a telescope..*

Picture by Alan Sheidler

ked eye at a very dark viewing location, but many can be seen with good binoculars or a small telescope. A few items require a higher power telescope. Messier was reported to have used a 4 inch refracting telescope, viewing from downtown Paris. Several members of the PAC

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(Continued on next page)

ASTRONOMY IN PRINT

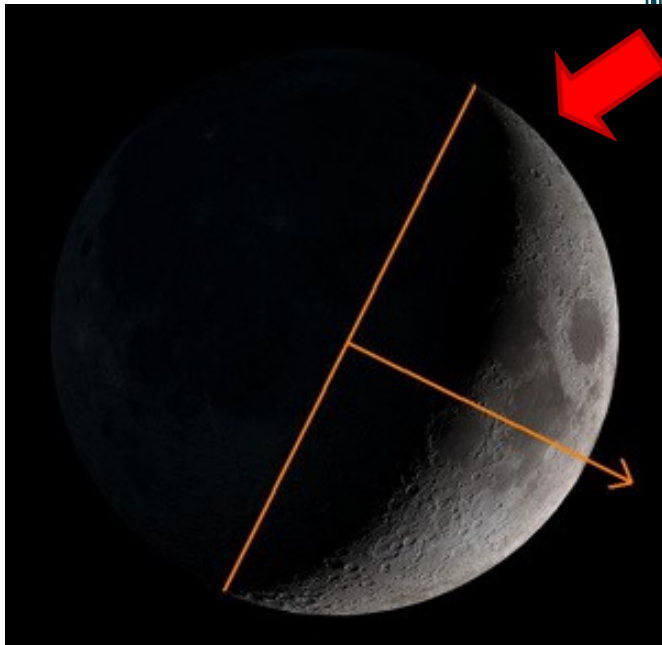
(continued)

((continued from previous page))

attempted the mini-marathon in November for the autumn list and again in December for the winter list. Four members completed the autumn list and have received certificates. One member has completed the winter list so far. The winter list includes the Great Orion Nebula (see picture) and the Pleiades star cluster, which is currently above the constellation of Orion in the southeast evening sky.

The PAC has public viewing sessions at the Niabi Zoo parking lot after sundown on the third Saturday of March through November and, weather permitting, will have several telescopes set up for public viewing of these objects. See the club web site

www.popularastronomyclub.org for more information.



*Picture 1 caption: (DSC_0698G M42 Orion Nebula.jpg)
Messier object M42 is the Orion Nebula, an area where new stars are forming, located over 1300 light years from the earth.
Picture by Alan Sheidler*

Using the Moons Phase as a guide toward the Sun

Draw a straight line from one horn to the other. Then from the middle of that line, between the horns, imagine another straight line perpendicular to the first (that is, at a “right” angle). The illuminated part of the crescent points to the sun. You can extend the line down to the point on the horizon roughly where the sun went down.

By the time the moon waxes to the first quarter phase, of course, the first line above is just the “flat” edge of the moon. After that phase, it becomes a bit harder to use the moon to find the sun’s position, when the sun is below the horizon, but experienced stargazers can and do still do it.

Why does this work? Well, it’s the sun that causes the moon’s phases. The moon is a globe in space, just as Earth is a globe. And like the Earth, the moon has a day side and a night side. The varying moon phases we see are just varying fractions of the moon’s day side.

Roy Gustafson

UPCOMING EVENTS



January 13th, 2019

Event: PAC regular meeting
Location: Butterworth Center at 7:00 PM.
Constellation Report : Terry Dufek
Program: Wayland Bauer

[LINK](#) to map of
 Butterworth
 Center complex.
 We are in
 building B

- **February 10th, 2020** PAC regular meeting at Butterworth Center at 7:00 PM.
- **March 9th, 2020** PAC Business meeting at Butterworth Center at 7:00 PM.
- **March 21st, 2020** Niabi Outreach at sunset
- **April 13th, 2020** PAC regular meeting at Butterworth Center at 7:00 PM.
- **April 18th, 2020** Niabi Outreach at sunset
- **May 11th, 2020** PAC regular meeting at Butterworth Center at 7:00 PM.
- **May 16th, 2020** Niabi Outreach at sunset
- **June 6, 2020** Giant Goose Conservation Area "Youth Day", Atkinson, Illinois - 8:00 am - noon, canceled if raining. Informational Tables and Solar Observing
- **June 8th, 2020** PAC business meeting at Butterworth Center at 7:00 PM
- **June 20th, 2020** Niabi Outreach at sunset
- **July 13th, 2020** PAC regular meeting at Butterworth Center at 7:00 PM

- **July 18th, 2020** Niabi Outreach at sunset
- **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
- **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.

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

Planetary and Lunar Phenomena for January

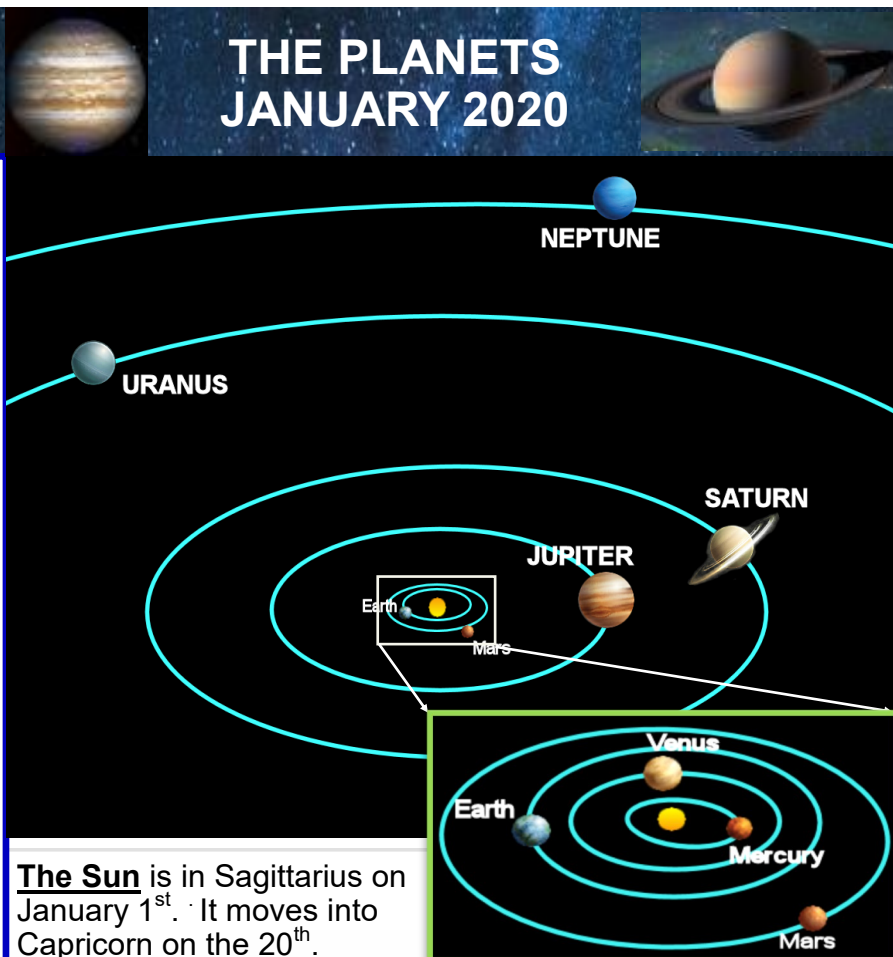
Phenomenon	Date and Time	Object 1	Object 2	Separation	Solar Elongation
Conjunction	2020-01-20 14:52:37	Moon	Mars	+1°29'10.2"	+48°31'06.2"
Conjunction	2020-01-22 21:16:31	Moon	Jupiter	+0°40'08.4"	+20°52'28.1"
Conjunction	2020-01-23 20:59:38	Moon	Saturn	+1°45'33.6"	+9°38'59.0"
Conjunction	2020-01-25 14:55:25	Moon	Mercury	+2°02'01.7"	+11°08'31.0"
Conjunction	2020-01-27 14:03:50	Venus	Neptune	+0°04'09.8"	+39°37'14.0"

ASTRONOMICAL CALENDAR OF EVENTS

(CST) adjusted for Daylight Savings
Time when applicable

Jan 01 19:30	Moon at Apogee: 404580 km
Jan 02 22:45	FIRST QUARTER MOON
Jan 04 03:00	Quadrantid Meteor Shower
Jan 05 02:00	Earth at Perihelion: 0.98324 AU
Jan 07 15:09	Aldebaran 3.0°S of Moon
Jan 09 17:29	Moon at Ascending Node
Jan 10 09:00	Mercury at Superior Conjunction
Jan 10 13:10	Pen. Lunar Eclipse; mag=0.896
Jan 10 13:21	FULL MOON
Jan 10 20:26	Pollux 5.3°N of Moon
Jan 11 17:54	Beehive 1.0°S of Moon
Jan 13 05:37	Regulus 3.8°S of Moon
Jan 13 08:00	Saturn in Conjunction with Sun
Jan 13 14:20	Moon at Perigee: 365964 km
Jan 17 06:58	LAST QUARTER MOON
Jan 17 17:03	Mars 4.7°N of Antares
Jan 20 13:13	Mars 2.3°S of Moon
Jan 22 14:31	Moon at Descending Node
Jan 22 20:42	Jupiter 0.4°N of Moon:
Jan 24 15:42	NEW MOON
Jan 28 01:29	Venus 4.1°N of Moon
Jan 29 15:28	Moon at Apogee: 405390 km

THE PLANETS JANUARY 2020



The Sun is in Sagittarius on January 1st. It moves into Capricorn on the 20th.

Mercury is in Sagittarius in the morning sky on the 1st (mag: -.96, dia: 4.69", ill: 99%). It moves toward conjunction with the Sun on the 9th. By the 31st, it is in the evening sky but very hard to see in the SW, being only 12° off the horizon at sunset.

Venus is in Capricorn, in the evening sky on the 1st (mag: -3.96, dia: 13.10", ill: 82%). Throughout the month, it continues to widen its distance from the Sun into the evening sky. It has a nice conjunction with an early moon on January 28th in the SW evening sky (see Skyview).

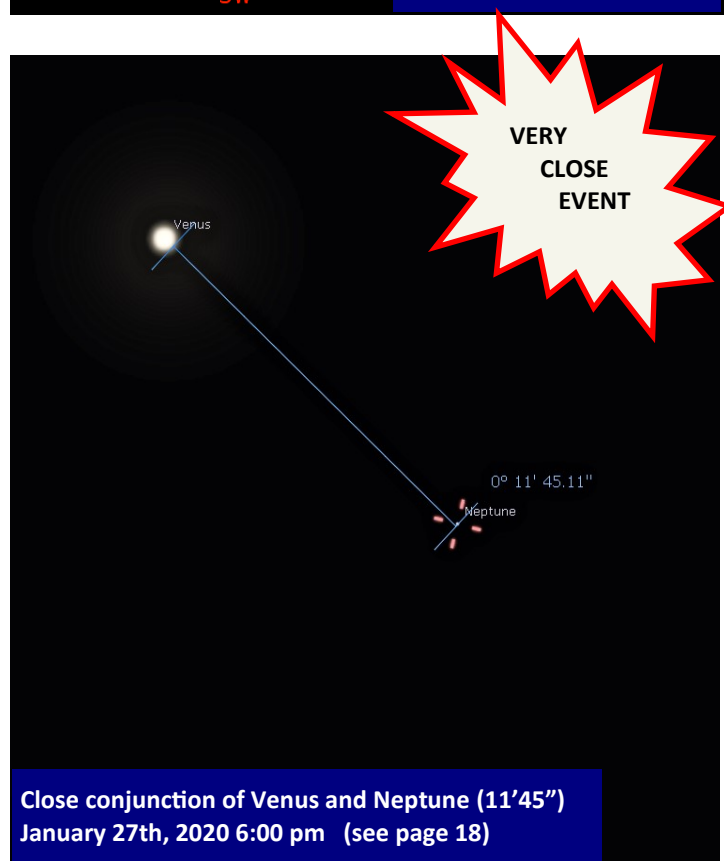
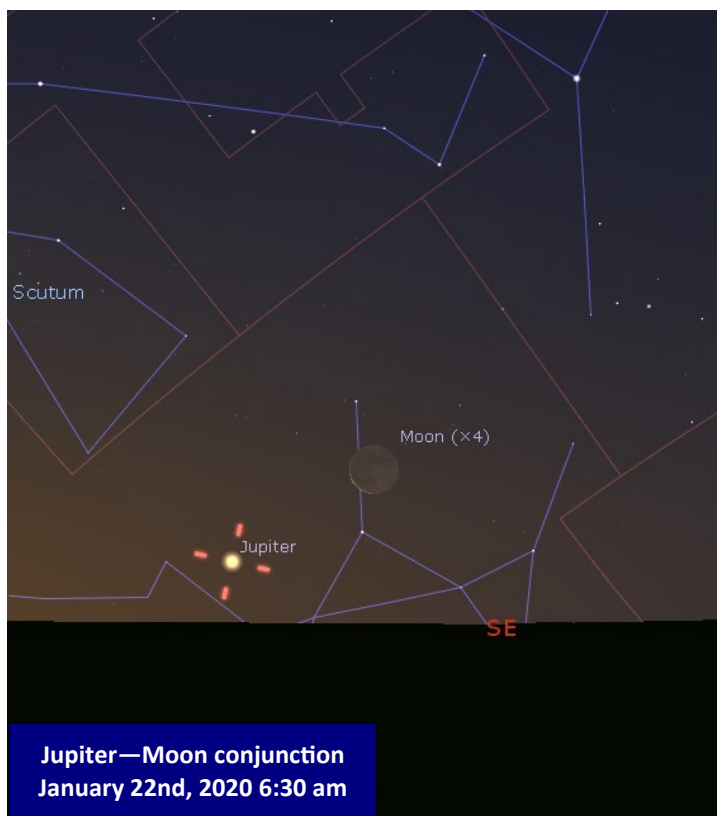
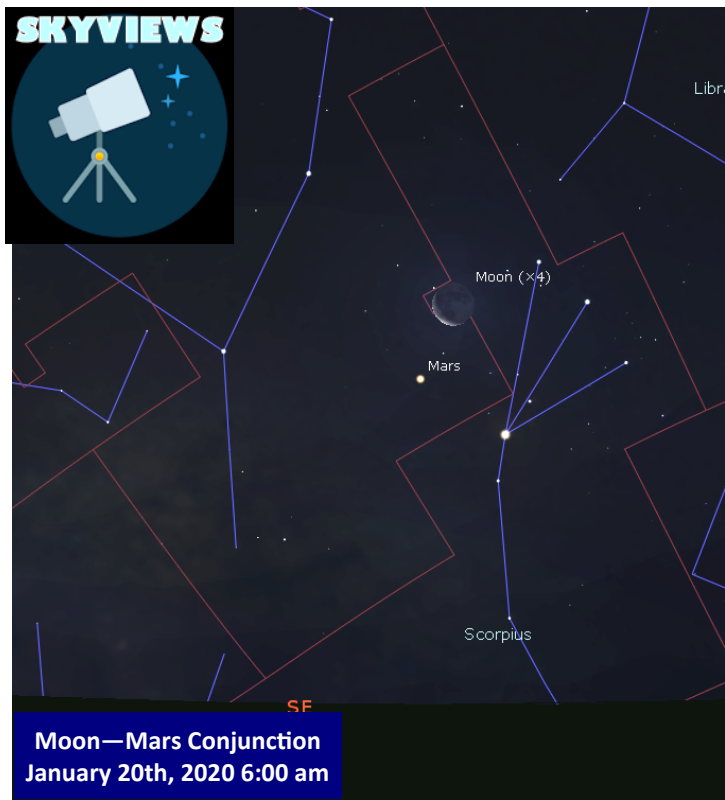
Mars is in Libra, in the morning sky on the 1st. (mag: 1.57, dia: 4.3"). It has a nice conjunction with a late phase Moon in the early morning sky on the 20th (see Skyview). It is 6° from Antares on the 23rd, making a nice color combination.

Jupiter is in Sagittarius on January 1st. It is only 3° above the horizon at Sunrise and way too close to the Sun for viewing most of the month. You might be able to glimpse it on the 31st, low in the SE sky at about 6:30 AM. (mag: -1.87, dia: 32.48") On the 22nd, you might be able to view it at the same time lower in SE close to the Moon (see Skyview).

Saturn is in Sagittarius on January 1st. It is only 8° above the horizon at sunset. It moves toward conjunction with the Sun on the 13th. By the 31st, the planet is about 7° above the horizon at sunrise by the end of the month. Unsuitable for viewing this month.

Uranus is in Aries on January 1st. It is high in the SE sky at 6:00 PM (mag: 5.74, dia: 3.63"). On January 4th the Moon passes 4° south of the planet. On January 31st, the Moon passes south of planet again by 5°.

Neptune is in Aquarius on January 1st. The planet is above the S-SW horizon by 38° at 6 PM (mag: 7.92, dia: 2.25"). On January 27th, **Neptune and Venus are separated by 11'45"** at 6 PM (see Skyview).



DEEP SKY WONDERS

For January
Evening Skies

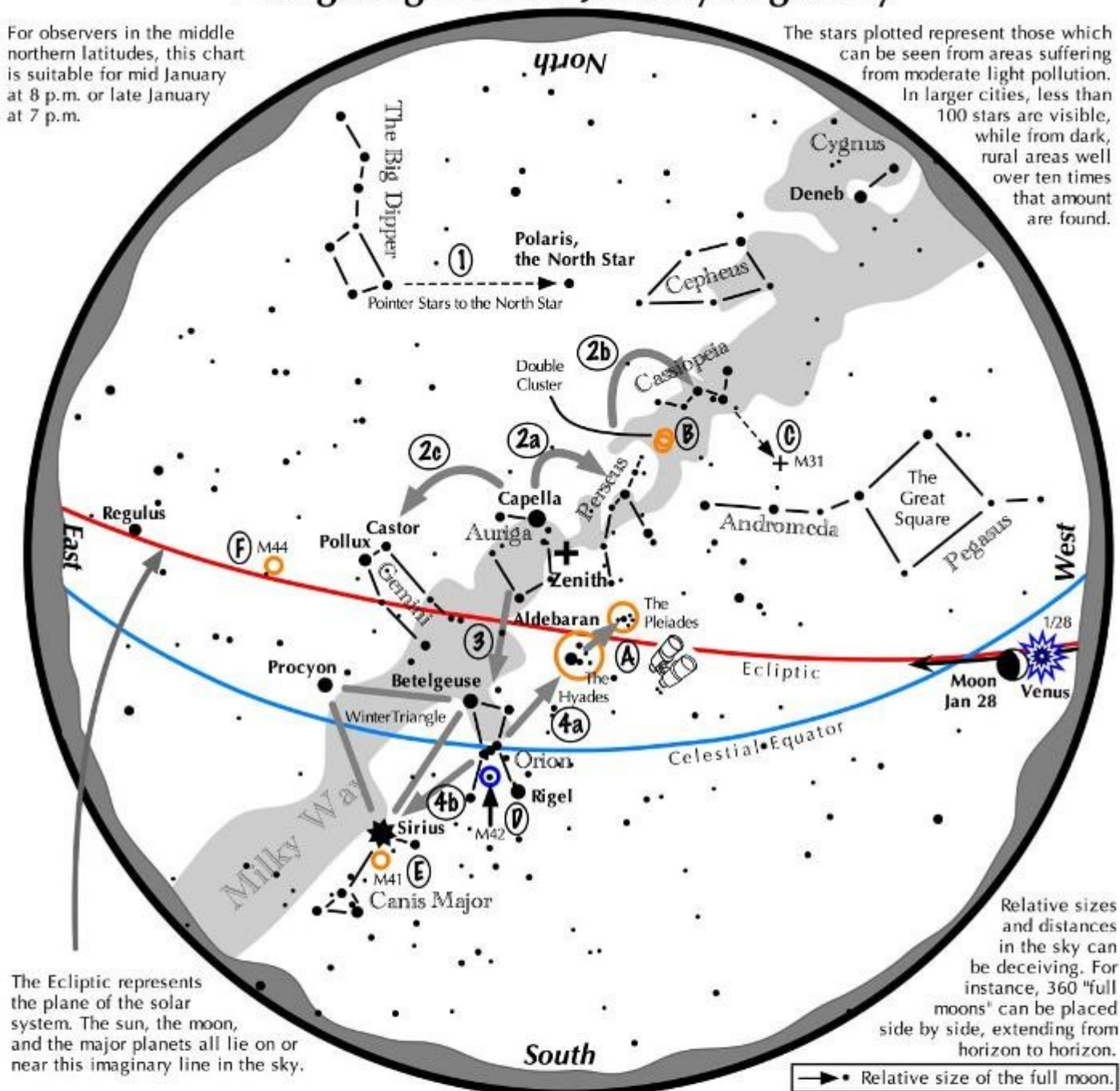
Name	RA (J2000)	Dec (J2000)	Mag.	A.S., '	S.B.	Transit	Type
NGC 2264 (Christmas Tree Cluster)	6h40m58.1s	+9°53'42.0"	4.05	17.000	8.40	0h03m	open star cluster
M 41 (Little Beehive Cluster)	6h46m01.0s	-20°45'25.2"	4.78	39.000	12.47	0h07m	open star cluster
NGC 2281 (Broken Heart Cluster)	6h48m17.0s	+41°04'40.8"	5.53	15.000	11.15	0h10m	open star cluster
NGC 2301 (Hagrid's Dragon Cluster)	6h51m45.1s	+0°27'36.0"	6.17	15.000	11.79	0h13m	open star cluster
M 31 (Andromeda Galaxy)	0h42m44.3s	+41°16'07.5"	3.73	250.800	13.63	18h03m	galaxy
NGC 225 (Sailboat Cluster)	0h43m39.1s	+61°46'30.0"	7.22	12.000	12.35	18h04m	open star cluster
NGC 457 (Dragonfly Cluster)	1h19m35.0s	+58°17'13.2"	6.60	20.000	12.85	18h41m	open star cluster
M 103	1h33m23.0s	+60°39'00.0"	7.59	6.000	11.22	18h54m	open star cluster
M 33 (Triangulum Galaxy)	1h33m50.9s	+30°39'35.8"	5.98	110.300	14.36	18h55m	galaxy
NGC 654 (Fuzzy Butterfly Cluster)	1h44m00.0s	+61°53'06.0"	6.69	5.000	9.92	19h05m	open star cluster
NGC 663 (Lawnmower Cluster)	1h46m08.9s	+61°14'06.0"	7.29	15.000	12.91	19h07m	open star cluster
NGC 869 (Double Cluster)	2h19m00.0s	+57°07'40.8"	3.98	30.000	11.10	19h40m	open star cluster
NGC 884 (Double Cluster)	2h22m23.0s	+57°07'30.0"	3.98	30.000	11.10	19h44m	open star cluster
IC 1805 (Heart Nebula)	2h32m42.0s	+61°27'00.0"	6.67	120.000	15.30	19h54m	cluster associated with nebulosity
M 34 (Spiral Cluster)	2h42m05.0s	+42°45'43.2"	5.38	25.000	12.10	20h03m	open star cluster
IC 1848 (Soul Nebula)	2h51m06.5s	+60°24'36.0"	6.67	50.000	12.91	20h13m	open star cluster
NGC 1342 (Little Scorpion Cluster)	3h31m37.9s	+37°22'37.2"	6.86	15.000	12.48	20h53m	open star cluster
IC 348 (o Per Cloud)	3h44m34.1s	+32°09'46.8"	7.46	20.000	12.20	21h06m	cluster associated with nebulosity
NGC 1432 (Maia Nebula)	3h46m00.0s	+24°12'00.0"	4.05	100.000	12.24	21h07m	HII region
NGC 1435 (Merope Nebula)	3h46m00.0s	+23°54'00.0"	4.35	60.000	11.47	21h07m	reflection nebula
M 45 (Pleiades)	3h47m00.0s	+24°07'01.2"	1.37	220.000	11.31	21h08m	cluster associated with nebulosity
NGC 1502 (Jolly Roger Cluster)	4h07m49.9s	+62°19'55.2"	7.05	7.000	11.01	21h30m	open star cluster
NGC 1528 (m & m Double Cluster)	4h15m23.0s	+51°12'54.0"	6.54	25.000	13.27	21h37m	open star cluster
NGC 1545 (m & m Double Cluster)	4h20m56.9s	+50°15'10.8"	6.34	18.000	12.36	21h43m	open star cluster
NGC 1555 (Hind's Variable Nebula)	4h21m57.1s	+19°32'07.1"	6.66	1.000	6.40	21h43m	HII region
NGC 1647 (Pirate Moon Cluster)	4h45m55.0s	+19°06'54.0"	6.55	40.000	14.30	22h07m	open star cluster
NGC 1807 (Poor Man's Double Cluster)	5h10m48.7s	+16°31'19.2"	7.15	17.000	13.04	22h32m	open star cluster
NGC 1817 (Poor Man's Double Cluster)	5h12m15.1s	+16°41'24.0"	7.85	16.000	13.61	22h34m	open star cluster
IC 405 (Flaming Star Nebula)	5h17m24.0s	+34°22'48.0"	6.14	80.000	13.81	22h39m	emission nebula
M 38 (Starfish Cluster)	5h28m43.0s	+35°51'18.0"	6.53	15.000	12.15	22h50m	open star cluster
NGC 1981 (Coal Car Cluster)	5h35m08.9s	-4°25'55.2"	4.39	25.000	11.12	22h56m	star cluster
M 42 (Great Orion Nebula)	5h35m17.3s	-5°23'28.0"	4.20	150.000	13.27	22h57m	HII region
NGC 1980 (The Lost Jewel of Orion)	5h35m24.0s	-5°54'54.0"	2.70	420.000	14.03	22h57m	star cluster
M 36 (Pinwheel Cluster)	5h36m18.0s	+34°08'24.0"	6.13	10.000	10.87	22h58m	open star cluster
M 37 (January Salt-and-Pepper Cluster)	5h52m18.0s	+32°33'10.8"	5.73	15.000	11.35	23h14m	open star cluster
NGC 2169 (The 37 Cluster)	6h08m24.0s	+13°59'24.0"	6.05	6.000	9.68	23h30m	open star cluster
M 35 (Shoe-Buckle Cluster)	6h08m54.0s	+24°19'58.8"	5.24	25.000	11.96	23h31m	open star cluster
NGC 2232 (Double Wedge Cluster)	6h27m15.1s	-4°45'28.8"	4.09	29.000	11.14	23h49m	open star cluster
NGC 2244 (Rosette Nebula)	6h31m55.0s	+4°56'31.2"	4.96	24.000	11.60	23h53m	open star cluster

* Data from Stellarium

Navigating the mid January Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid January at 8 p.m. or late January at 7 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 winter night sky: Simply start with what you know or with what you can easily find.

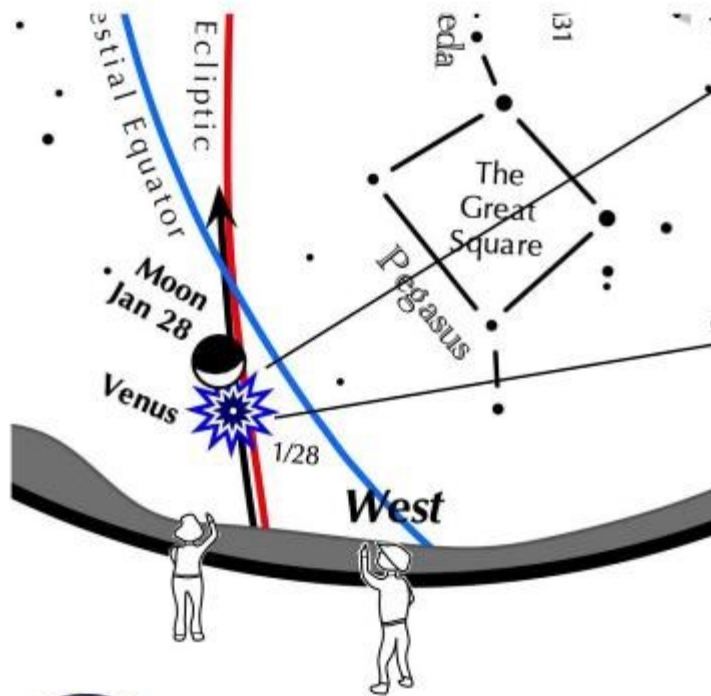
- 1 Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
- 2 Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Persues, then to the "W" of Cassiopeia. Next Jump southeastward from Capella to the twin stars Castor and Pollux of Gemini.
- 3 Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star, Rigel.
- 4 Use Orion's three Belt stars to point to the red star Aldebaran, then to the Hyades, and the Pleiades star clusters. Travel to the southeast from the Belt stars to the brightest star in the night sky, Sirius.

Binocular Highlights

- A: Examine the stars of the Pleiades and Hyades, two naked eye star clusters.
- B: Between the "W" of Cassiopeia and Perseus lies the Double Cluster.
- C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval.
- D: M42 in Orion is a star forming nebula. E: Look south of Sirius for the star cluster M41. F: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.

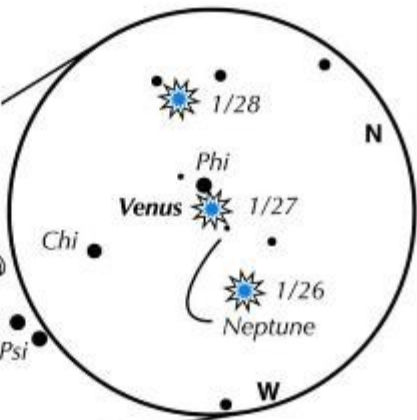


If you can observe only one celestial event this month, consider this one:



West 90 minutes
after sunset
in late January

View
through
10x50 binoculars

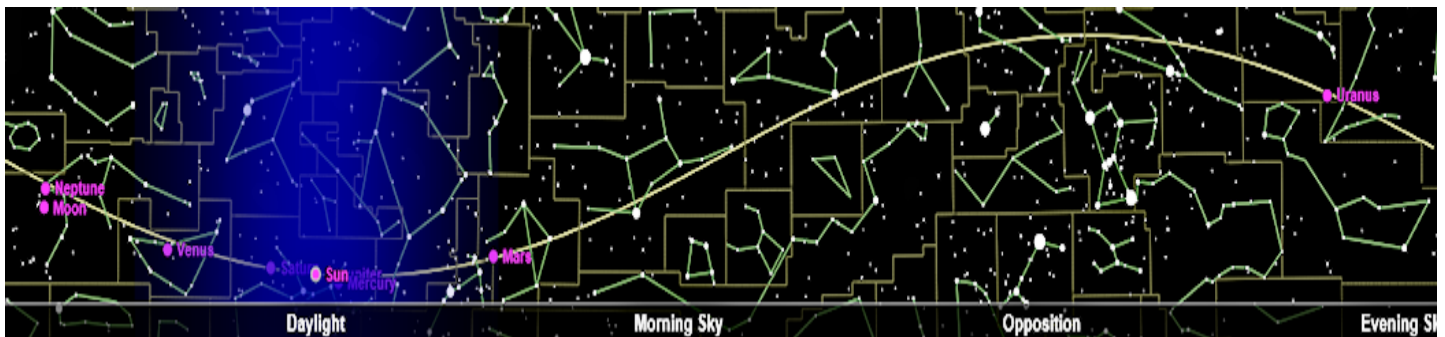


Discover Neptune

Look to the west 90 minutes after sunset.

- Venus will be the bright object low in the west.
- Aim binoculars at Venus on the night of January 27.
- Immediately above the planet is Phi Aquarii, a 4th magnitude star.
- Carefully look just to the lower right of Venus, about the same distance Phi is from it.
- A very dim "star" – Neptune – appears in a clear, dark sky.
- A dim star lies to the lower right of Neptune, about twice the distance Neptune lies from Venus.
- On January 28, the light from the nearby crescent moon may interfere with observations.

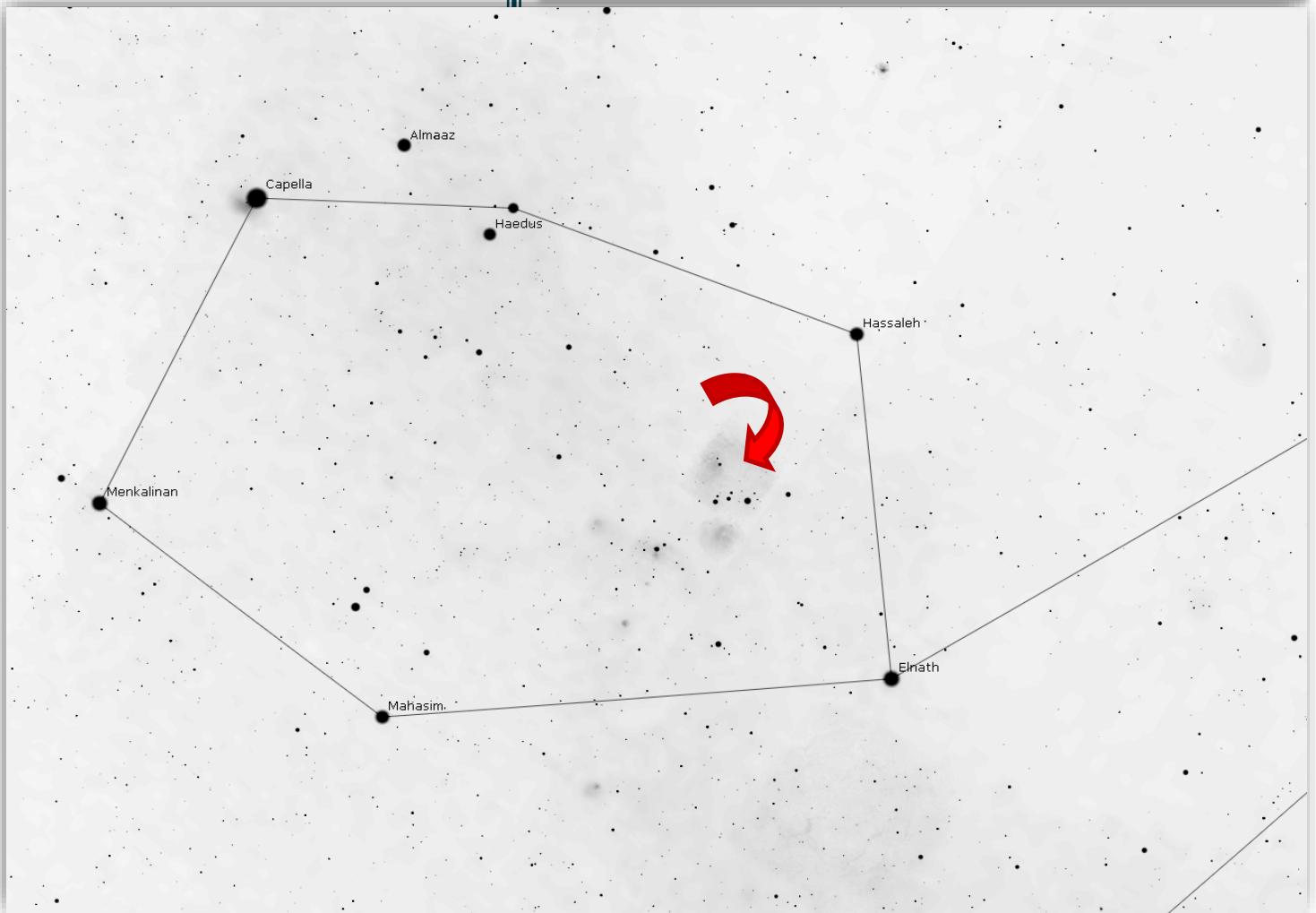
Clear, dark skies will be needed to spot Neptune!



From [in the sky.org](http://inthesky.org)

Spotlight: IC 405 (Flaming Star Nebula)

- an emission and reflection nebula in the constellation Auriga
- It shines at magnitude +6.0
- surrounds the irregular variable star AE Aurigae
- The nebula measures approximately 37.0' x 19.0'
- lies about 1,500 light-years away from Earth
- It is believed that the proper motion of the central star can be traced back to the Orion's Belt area
- Like the Orion Nebula, this is a star factory, and the gas is energized by its associated star cluster NGC 1893





This article is distributed by NASA Night Sky Network

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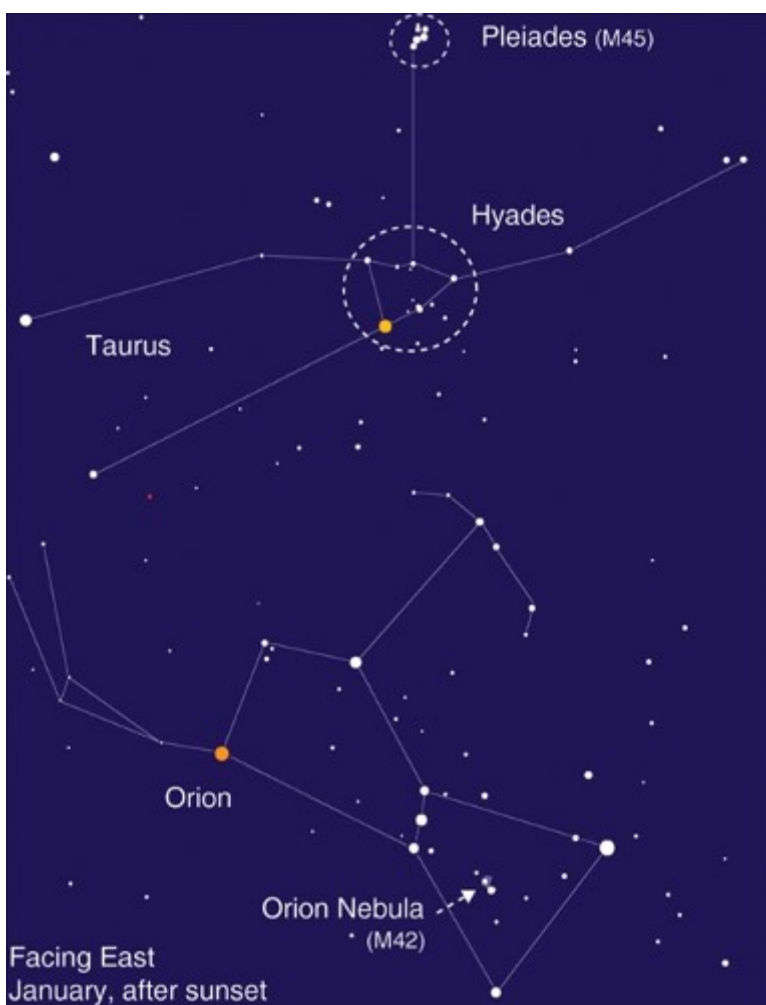
Spot the Young Stars of the Hyades and Pleiades

By David Prosper

Orion is the last of a trio of striking star patterns to rise during the late fall and early winter months, preceded by the diminutive Pleiades and larger Hyades in Taurus. All three are easily spotted rising in the east in early January evenings, and are textbook examples of stars in different stages of development.

As discussed in last month's Notes, the famous Orion Nebula (M42), found in Orion's "Sword," is a celestial nursery full of newly-born "baby stars" and still-incubating "protostars," surrounded by the gas from which they were born. Next to Orion we find the Hyades, in Taurus, with their distinctive "V" shape. The Hyades are young but mature stars, hundreds of millions of years old and widely dispersed. Imagine them as "young adult" stars venturing out from their hometown into their new galactic apartments. Bright orange Aldebaran stands out in this group, but is not actually a member; it just happens to be in between us and the Hyades. Traveling from Orion to the Hyades we then find the small, almost dipper-shaped Pleiades star cluster (M45). These are "teenage stars," younger than the Hyades, but older than the newborn stars of the Orion Nebula. These bright young stars are still relatively close together, but have dispersed their birth cocoon of stellar gas, like teenagers venturing around the neighborhood with friends and wearing their own clothes, but still remaining close to home - for now. Astronomers have studied this trio in great detail in order to learn more about stellar evolution.

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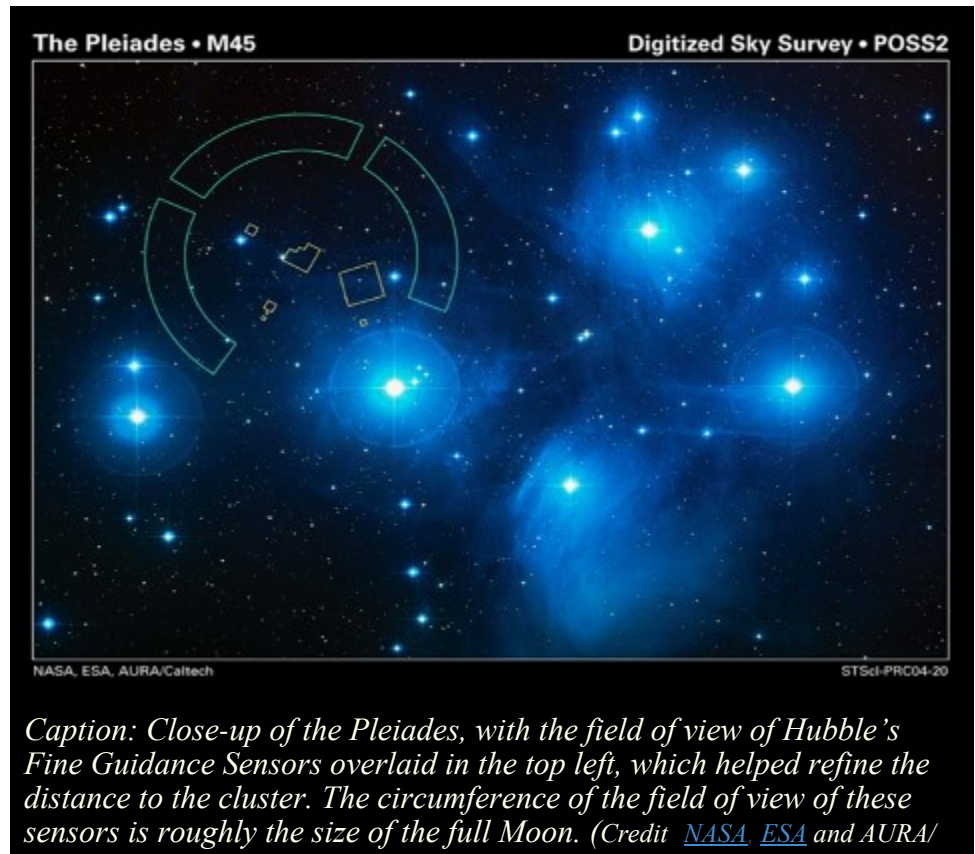
Caption: Locate Orion rising in the east after sunset to find the Orion Nebula in the "Sword," below the famous "Belt" of three bright stars. Then, look above Orion to find both the Hyades and the Pleiades. Binoculars will bring out lots of extra stars and details in all three objects, but you can even spot them with your unaided eye!



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Figuring the exact distance of the Pleiades from Earth is an interesting problem in astrometry, the study of the exact positions of stars in space. Knowing their exact distance away is a necessary step in determining many other facts about the Pleiades. The European Space Agency's Hipparcos satellite determined their distance to about 392 light years away, around 43 light years closer than previous estimates. However, subsequent measurements by NASA's Hubble Space Telescope indicated a distance of 440 light years, much closer to pre-Hipparcos estimates. Then, using a powerful technique called Very Long Baseline Interferometry (VLBI), which combines the power of radio telescopes from around the world, the distance of the Pleiades was calculated to 443 light years. The ESA's Gaia satellite, a successor to Hipparcos, recently released its first two sets of data, which among other findings show the distance close to the values found by Hubble and VLBI, possibly settling the long-running "Pleiades Controversy" and helping firm up the foundation for follow-up studies about the nature of the stars of the Pleiades.

You can learn more about the Pleiades in the Universe Discovery Guide at bit.ly/UDGMarch, and find out about missions helping to measure our universe at nasa.gov.



Caption: Close-up of the Pleiades, with the field of view of Hubble's Fine Guidance Sensors overlaid in the top left, which helped refine the distance to the cluster. The circumference of the field of view of these sensors is roughly the size of the full Moon. (Credit [NASA](https://nasa.gov), [ESA](https://esa.europa.eu) and AURA/



NEWSLINKS

Hubble Space Telescope Observes NGC 5468

December 2nd, 2019

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Great Red Spot Isn't Disappearing, Researchers Say

November 26th, 2019:

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Evidence suggests some super-puffs might be ringed exoplanets

December 5th, 2019

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In a first, astronomers find traces of a planet orbiting a white dwarf

December 7th, 2019

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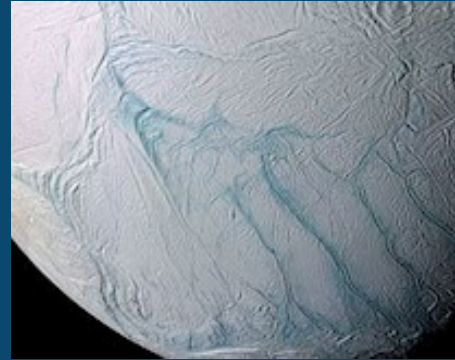


NEWSLINKS

Explaining the 'tiger stripes' of Saturn's moon Enceladus

December 9th, 2019

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NASA's Parker probe has spotted the Geminid meteor showers' source

December 12th, 2019

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VLT Spots Huge Halos of Cool Hydrogen around Active Galaxies in Early Universe

December 20th, 2019

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Kepler-51 is Home to Three Super-Puff Exoplanets

December 20th, 2019

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NEWSLINKS

Hello, Venus! Parker Solar Probe Makes Second Planetary Flyby

December 26th, 2019

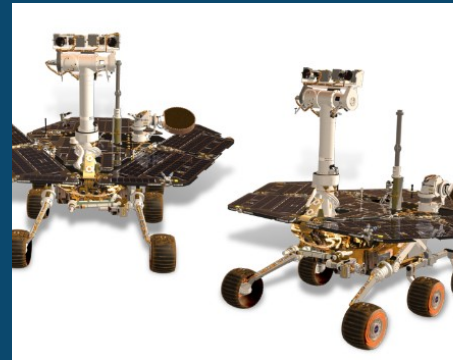
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NASA's Decade in Space: The Highs and Lows of the US Space Agency's 2010s

December 26th, 2019

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HabEx: New Mission Proposed to Search for Second Earth

December 26th, 2019

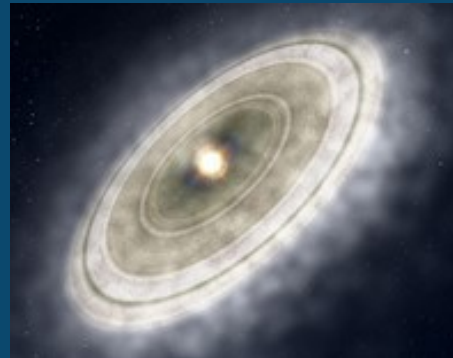
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ALMA Finds Rare Carbon Isotope in 49 Ceti's Debris Disk

December 24th, 2019:

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Member Observations

Photography from Ken Boquist

The Orion and Soul nebulas were shot from my backyard in Rock Island with a 5.1" scope, while the California (next page), Heart, and IC 1396 nebulas were shot at Sherman Park with an 80mm scope. The three nebulas shot at Sherman Park are probably suffering from some clouds that were passing through. The weather service promised clear skies, but that didn't happen. Regarding IC 1396 (next page), the dark nebula hanging down from the top and pointing towards the bright star just above center is the well known "Elephant's Trunk" nebula. The Elephant's Trunk nebula is thought to be the site of new star formation, as infrared images show some very young stars of less than 100,000 years old being present. The shot of M 42 was done using some special techniques to try to

(continued in next column)

Sh 2-190 - Heart Nebula



Westerhout 5 - Soul Nebula



M 42 - Great Nebula in Orion



avoid burning out the central part of the nebula. That, along with some light sharpening in an image processing program, really helped to bring out some details. I'm still trying to get the Trapezium (the four stars in the center of the nebula) to show up, but that requires much better seeing than what I've been getting lately.

Ken Boquist

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Member Observations

(continued from previous page)

December 6th, 2019

IC 1396



Photos by Ken Boquist

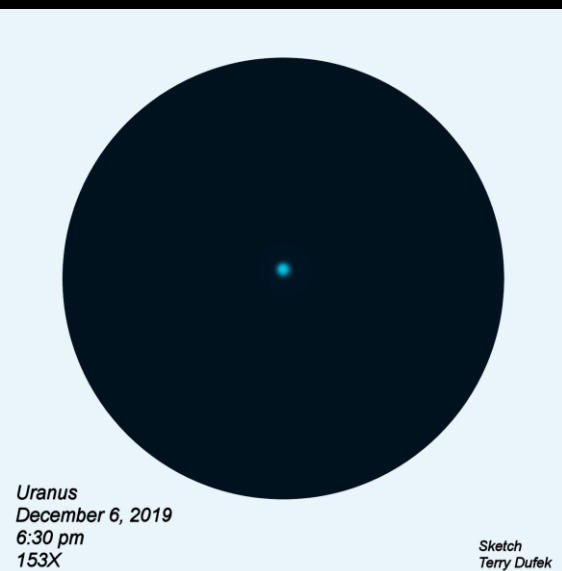
NGC 1499 - California Nebula



It was clear with a gibbous Moon high in the eastern sky (at Paul Castle) so I decided to use my new polarizing filter for the first time. It worked great on Venus, reducing the glare to where you could just see slight streaks of a light grey on the planet. It had a great effect on the Moon, allowing it to be more easily viewed with a huge amount of reduction of glare. I can see possibilities of using this to get better photos of the Moon also.

I had a great view of Uranus (see sketch) which took high magnification well. The pearly blue color of the disk was distinctly beautiful. I can say this is the best view of the planet I have seen so far! Like a nice blue pearl.

Terry Dufek



Uranus
December 6, 2019
6:30 pm
153X

Sketch
Terry Dufek

Paul Castle Observing Sessions

December 6th, 2019

Last night (Dec 6th), we took advantage of the clear sky and had an observing session. In the photograph are Al Sheidler, Steve Sinksen and Terry Dufek. Terry set up his scope and we opened the observatory and used the 6" refractor to make the following observations.

Before it got completely dark, we targeted the waxing gibbous moon. The 6" refractor provided crystal clear views of the craters located in the day/night terminator. Terry demonstrated a variable polarizing filter on his scope which tamed the blinding brightness of the lunar landscape for comfortable viewing. We then targeted Venus which sports a tiny gibbous phase at the present time. Saturn was the next target. Both planets are currently low in the western sky, so we made sure to draw a bead on them before they sank from view. Using the 6" refractor, we again targeted the moon and using RA/DEC coordinates from Stellarium, we adjusted the setting circles to calibrate the mount. From Stellarium we then obtained the coordinates for Uranus and using the setting circles, we found planet 7's diminutive bluish disk. From there, we again used the setting circles to find Neptune. Neptune is a darker blue color than Uranus and much smaller in size. Last night, Neptune was very close to a slightly dimmer field star making an attractive pairing in the eyepiece view.

Having satisfied our desire to observe solar system objects, we then decided to target Epsilon Lyrae, the famous Double-Double, multiple star in Lyra. Using the 6" refractor and a 25mm eyepiece coupled with a barlow lense, we were amazed how easily the doubles were split. The component stars in 4-Epsilon are 5.4 and 6.5 magnitude with a separation of 2.6 arcseconds. The component stars in 5-

Epsilon are 5.1 and 5.3 magnitudes with a separation of 2.3 arcseconds. Both doubles were within the same 144x eyepiece view. The stars resembled tiny sparkling diamonds. Dazzling indeed!

Using the setting circles we then targeted globular clusters M13 and M92 in Hercules. Because of the bright moon and due to them being low in west, the views of these globulars were not the best. For my money, I think M92 was actually nicer than M13 last night. It was higher in the sky and it's tight structure made it stand out better against the moon glow.



We then attempted to find M57, the Ring Nebula in Lyra. This required scanning the general area and while doing that we accidentally stumbled onto Beta Lyrae and very nice double star. The component stars are magnitude 3.4 and 8.6 with a separation of 46 arcseconds. This is a wide double and easy to split, but the difference in magnitude of the component stars makes for an interesting view in the eyepiece. After admiring this double, we looked up it's co-

ordinates and verified the setting circles were correctly calibrated and then swung over and nailed M57 which is right nearby. The Ring was definitely ghostly but attractive using the 25mm eyepiece despite the sky glow from the gibbous moon.

We ended up the evening's observing with a spectacular view of Albireo the famous blue and gold double star in Cygnus. The view last night through the 6" refractor was splendid. The color contrast was very stark. The brighter star is deep yellow or gold and the smaller one a rich blue.

By this time, Terry's scope was iced over in frost and we were all getting cold so we ended our observing session. Thanks.

Al Sheidler.

Paul Castle Observing Sessions

December 22nd, 2019

Last night a small group of us met at the Paul Castle Memorial Observatory to take advantage of the clear skies and warm December weather. In the group photo are Steve Sinksen, Rusty Case, Dale Hachtel and Al Sheidler. Gary Nordick also joined the group after this photo was taken. We started out by observing the planet Venus and grilling bratwurst on the charcoal grill while we waited for it to get dark. Our goal for the evening was to observe the 27 objects in the NCRAL Winter Messier Marathon list. I think one of us actually had the fortitude to complete the list and will be sending it in for the award. The rest of us succumbed to the cold gave up around 9:00pm. Some of the objects rise pretty late this early in the season, so we plan to try again in January or February.

The photographs were taken with a Nikon D7500 camera attached to a 10" Meade LX200 telescope with a 0.63 focal reducer (yielding an effective focal length of 1575mm. Camera settings:

M1 --> 25seconds at ISO 25600

M42 --> 15seconds at ISO 12800

Trapezium --> 2 seconds at ISO 12800

M36, 37 & 38 --> 5 seconds at ISO 12800

Thanks and Merry Christmas.
Al Sheidler



(left to right) Steve Sinksen, Rusty Case, Dale Hachtel and Al Sheidler.



The Crab Nebula (M1) by Al Shiedler

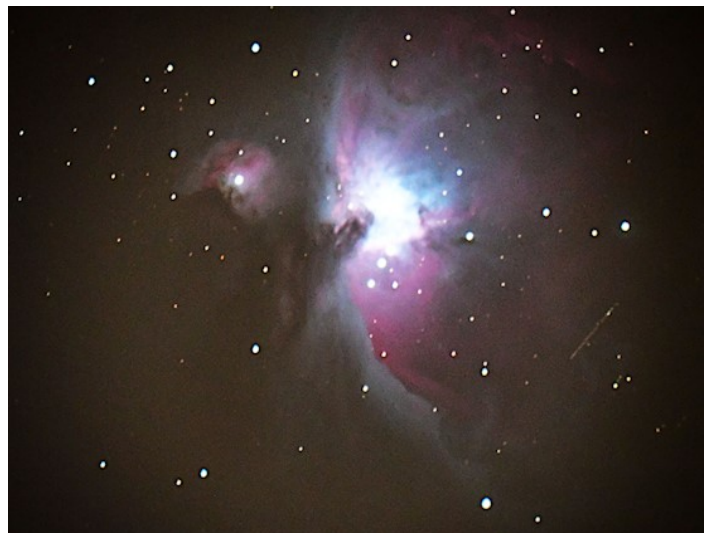
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Paul Castle Observing Sessions



M36 Pinwheel Cluster by Al Sheidler



M42 Orion Nebula by Al Sheidler



M37 Salt and Pepper Cluster by Al Sheidler



M38 Starfish Cluster by Al Sheidler



The Trapezium by Al Sheidler



PAC MONTHLY MEETING

President Alan Sheidler called the December business meeting of the Popular Astronomy Club to order at the Butterworth Center at 7:00 p.m. local time, on December 9th, 2019. We had 24 members and 0 guests attending.

- Al introduced new member Steven Sinksen attending for the first time

Business meeting starts:

Secretary

- Last business meeting notes were published in October Reflections. No corrections were noted by members. No corrections were noted this evening. Motion was made to accept the notes as published by Wanda Gacioch. Motion was seconded by Roy Gustafson and approved by the majority with no dissent.
- New header for newsletter was shown reflecting affiliated with NCRAL

Treasurers Report

- Dale reviewed the quarters receipts, expenditures and account balances (report published in this issue)
- A discussion to change an account to “business special” to reflect its current status
- Dale reminded members to renew if they haven’t already.
- A motion was made to accept the treasurers report as submitted by Gerry Pearson. It was seconded by (?) and approved by a majority with no dissent.

Vice Presidents Report

- No outstanding business
- Working towards and Outreach Projects with the Henry County Humane Society in 2020
- Working with the committee on the refurbishment of the Paul Castle Observatory project (to be discussed later)

Director of Observatories Report

- PACMO had been re-tarped after the wind storm at thanksgiving by Rusty and Terry

(continued in next column)

- Working to get quotes to refurbish the dome at Paul Castle Observatory.
- Gary and Rusty are working on pier design.

ALCOR

- Roy reported that awards for the Fall NCRAL Messier program had been passed out to Wayland, Terry and Al. An award for Rusty completing the list will be made in January.
- Information about NCRAL 2020 by the Northern Cross Science Foundation, scheduled May 1-2, 2020, Port Washington WI, is still coming.

New Business

- PAC Elections were held for 2020-2021. The existing slate of candidates were running for their existing positions. No other members submitted their names and no mailed in ballots were received. Al Sheidler announced this would be his last term.
- The candidates for the election were: Al Sheidler (president), Dino Milani (Vice President), Dale Hachtel (Treasurer), Terry Dufek (Secretary), Rusty Case (Director of Observatories), and Roy Gustafson (ALCOR).
- A motion was made to accept the ballot of candidates as presented by(?). It was seconded by (?) and approved by the majority with no dissent.
- A reminder was made for members to renew.
- The participation sign up sheet for 2020 was passed around.
- A committee for the Paul Castle Remodeling had been formed.
- A review for the parts of the project was presented (see last months reflections (page 6))
- The old telescope (refractor) is to be sold
- A motion was made to accept the committees plan was made. It was moved by Mark and seconded by Gerry. It was approved by the majority with no dissent.
- It was discussed on use of the Paul Castle on how to get access.
- It was noted that a minimum of two people were necessary for safety.
- Once the observatory was refurbished, a new

(continued on next page)

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manual for usage would need to be created.

A motion was made to adjourn the business meeting. It was moved, seconded and approved by a majority with no dissent .

Observations:

- Frank Stonestreet observed a meteor
- Dale observed a conjunction of Venus and Jupiter with his hiking club
- Review photos taken of deep sky objects.
- Reviewed last Niabi outreach for the year in November
- Reviewed Paul Castle December 6th, observing session

Award:

- Al present an Astronomical Award of achievement to Ken Boquist (left) for completing the **Astronomical League Asterism Observing Program** for observing 100 asterisms .
- It should be noted that Ken has now completed 19 Astronomical League Observing Programs.

- Ken reviewed the **Astronomical League program Lunar Observing Program**. Anyone can do. You have to observe 100 lunar objects (1/3 with the naked eye, 1/3 with binoculars, and 1/3 with telescopes.
- Al reviewed the **NCRAL Messier Observing Award** requirements. Al suggested we try to do the Winter List December 20 or 21 (weather permitting)

Constellation Report

- Dale presented a constellation report for Aries

Program

- Roy presented the “Year in Review” on PAC Accomplishments

Al reviewed the next meeting date, program and constellation report

The meeting was adjourned.



Elected for 2020—2021 (from left to right) Dino Milani— Vice President, Terry Dufek—Secretary, Rusty Case— Director of Observatories, Roy Gustafson—ALCOR, Al Sheidler—President and Dale Hachtel— Treasurer

description	current period detail	current	YTD
Receipts:			
memberships	23 renewals, 1 new, 14 family	825.00	940.00
member donations	2 supporting, 2 sustaining, 2 patron	180.00	180.00
program donations	3 programs, PACMO box	372.00	1644.00
misc donations	The Harry & Lillian Nelson Charitable Fund	5000.00	5025.00
interest		0.46	0.54
banquets		800.00	800.00
birdies	John Deere Classic	1634.20	1634.20
calendars			45.50
NCRAL 2019 receipts			13239.32
sales of items			150.00
other			145.00
Total Receipts		8811.66	23803.56

Expenditures:			
programs			30.00
speakers			0.00
PACMO operation	towing, rent for storage	623.16	1263.11
observatory			301.00
maintenance			85.00
Astronomical League			180.00
insurance			986.00
web page			96.00
banquet		664.38	664.38
miscellaneous		-21.01	989.45
NCRAL 2019		532.00	12281.95
PACMO upgrade			461.19
other			1200.00
Total Expenditures		1798.53	18538.08

Balances	as of 11/30/2019		
previous balance			
net change	7013.13		5265.48
ending balance	7013.13		5265.48
check account			10086.55
money market account			212.27
savings account			5.23
business special			3445.37
cash			26.00
undeposited checks			0.00
Total Cash Assets			13775.42

Popular Astronomy Club of the Quad Cities, Inc.

<http://www.popularastronomyclub.org/>



SIGN UP REPORT

MONTH	NEWSPAPER ARTICLES	CONSTELLATION REPORT	PROGRAM
JAN 2020	Dale and Joanne Hachtel	Terry Dufek-Eridanus	Wayland Bauer—Seasons
FEB 2020	Sara Sheidler		Terry Dufek– Globular Clusters
MAR 2020	Dale and Joanne Hachtel	Jan Gustafson	SMORGASBORD (SEE BELOW)
APR 2020	Jeff Struve		
MAY 2020	Dino Milani		Ian Spangenberg
JUNE 2020	Terry Dufek	Anne Bauer	SMORGASBORD (SEE BELOW)
JULY 2020	Jeff Struve		
AUG 2020		PICNIC	PICNIC
SEPT 2020	Ian Spangenberg	Ian Spangenberg	SMORGASBORD (SEE BELOW)
OCT 2020		BANQUET	BANQUET
NOV 2020			
DEC 2020	Terry Dufek		Roy Gustafson– Year in Review

SMORGASBORD

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.

March 2020

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June 2020

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September 2020

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