Reflections

The Newsletter of the Popular Astronomy Club

ESTABLISHED 1936

Affiliated with

March 2020

President's Corner MARCH 2020

Alan Sheidler

Welcome to another edition of "Reflections", the universe's best astronomy newsletter. It is always a challenge for me to come up with something interesting to pique your interest and get you to delve further into the newsletter. I certainly hope my presidential reflections are not the only reason you read PAC's newsletter. There is plenty of interesting subject matter here beyond anything I can say to entice you to read further. Rather than taking time here to highlight this newsletter's content, this time I would like to urge you to get involved with a little winter observing.

I realize winter is typically a time when many of us might want to take a "vacation" from observing due to freezing temperatures and cloudy skies. Indeed the next public observing session scheduled on PAC's calendar is the March 21st Niabi Zoo observing session. In the meantime, why not satisfy your desire to get out there and glimpse some of those impressive winter objects which are only visible this time of year? You can read about the club's February 21st observing session in this edition of the newsletter. A small group of us convened at the Paul Castle Memorial Observatory to view all 27 of the Messier objects listed in NCRAL's Winter Messier Marathon. To my knowledge, at this session, three of us were successful in bagging all 27 of the objects. I am looking forward to acknowledging the achievements of these observers at a future PAC meeting. Congratulations to those intrepid individuals for stepping up and participating. In the meantime, however, I would like to ask if anyone else is interested in observing these objects? Please let me know if you are. I am hoping to have at least one more observing session this winter to enable folks to observe these objects in a group setting. Observing sessions can be solitary endeavors, but indulging in group observing sessions brings another dimension to the activity. Having multiple scopes set up affords one the opportunity to view objects with different hardware and levels of magnification. Personally, I have always enjoyed the social aspects of observing too. For example, it is fun to hear the exclamatory comments of folks glimpsing M42 (the Orion Nebula) for the first time in a telescope. During the February 21st Messier session, there were many comments by all of us as we rotated from scope to scope to view the various objects as each operator drew a bead on each object. During this session, one of us (Byron Davies) had an

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R2 video camera attached to his scope. Images were presented in real time on a small TV screen which the group could easily gather round and view. Byron's view of M42 was very colorful and memorable.

As I am writing this column, I am hoping to organize another Winter Messier observing session while there is still time (before Spring rolls around) at the Paul Castle Memorial Observatory. Stay tuned to your email so you will be informed of this next observing session. In any event, let me just invite you to get involved in participating in the Winter Messier Marathon and the Spring Marathon. To qualify for the NCRAL Messier Award, the observer must make and record their own observations. But, getting together as a club and working on this as a club is fun and rewarding. I would encourage you all to participate. If you would like to make the observations, but do not have a telescope, let me know and we will provide you with a telescope and help instruct you (if needed) in the proper operation of the telescope. I would like to thank the leadership of NCRAL for setting up the Seasonal Messier Observing Program. This is a great way to encourage folks to get out and observe and learn about some truly spectacular objects which are visible during the seasonal time frame around which each program is organized. I would encourage you all to participate.

Keep looking up!

Alan Sheidler

(Continued in next column)

Group Photo out a cold observing session at Paul Castle on February 22nd, 2020. (Left to right) Al Sheidler, Alex, Mary and Hugh Holt, Byron Davies and Terry Dufek.

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ANNOUNCEMENTS / INFO

LOOKING FOR OLDER ISSUES OF REFLECTIONS NEWSLETTER?
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HISTORY OF PAC?
Click

Popular Astronomy Club on Facebook?
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Welcome To New Members

Matt Neilssen
Byron Davies

Editors Note: Starting with this issue a little bit and the next issue even more, internet links will be represented by this symbol. Just click on it and it will take you to the story/ video/ site.

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

CLICK

Check out the Astronomical League **ONLINE!** **CLICK**

NCRAL VISION 2020

CONTRIBUTIONS

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

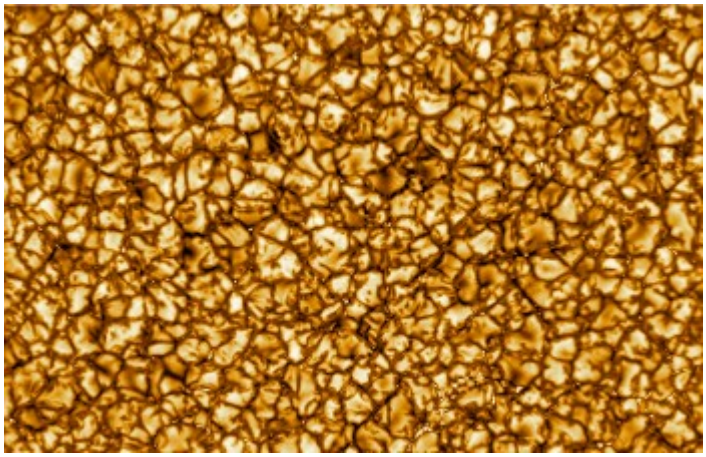
NCRAL Seasonal Messier Marathon Program Rules

NCRAL WINTER Seasonal Messier List

NCRAL SPRING Seasonal Messier List

NCRAL SUMMER Seasonal Messier List

NCRAL AUTUMN Seasonal Messier List



This is the Highest Resolution Image Ever Taken of the Surface of the Sun

Feast your eyes on this incredible picture of the surface of our nearest star: the Sun. This photo was taken by the newly completed Daniel K. Inouye Solar Telescope, which is perched atop Maui's Haleakala volcano. You're seeing granules on the surface of the Sun, convection cells of solar material carried up from the interior of the star like blobs of wax in a lava lamp. They look small, but each one of these granules is the size of Texas. Once these convection cells release their heat into space, they cool down and fall back down into the Sun in dark lanes at the boundaries of the cells.
Apart from being an absolutely stunning image, of course, it's scientifically fascinating. These precise, clear images of the Sun will help astronomers understand how the Sun works, and help predict changes in space weather, which we know can impact us here on Earth.

The Sun is a gigantic, ongoing ball of plasma and nuclear fusion. It's good to know we're keeping a good eye on it now.
Thanks!

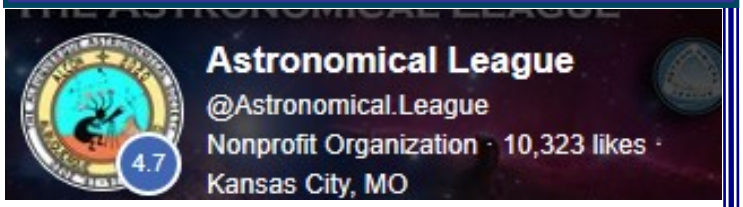
Fraser Cain
Publisher
Universe Today

CONTRIBUTIONS

The Mid-States Regional Astronomical League Conference 2020

Date: Friday, 6/12/2020 - Sunday, 6/14/2020
Time: 12:00 PM Friday - 11:30 AM Sunday
Location: Jenks Planetarium, 205 East "B" Street, Jenks, OK 74037

CONTRIBUTIONS



Your Astronomical League strives to bring you valued benefits to enhance your enjoyment of the celestial realm.

Consider these wonderful opportunities available through the League…

Astronomics Sketching Award (sponsored by Astronomics)
• Imaging Awards (currently without sponsorship)
• Astronomy Day Awards (sponsored by the American Astronomical Society, and Sky and Telescope)
• National Young Astronomer Awards (sponsored by Explore Scientific)
• Horkheimer Youth Awards (sponsored by the Horkheimer Charitable Fund)
• Leslie Peltier Award (sponsored by Explore Scientific)
• Horkheimer Library Telescope drawing (sponsored by the Horkheimer Charitable Fund with assistance from Orion Telescopes and Celestron)

All these programs receive generous sponsorship (except the Imaging Award which has no current sponsor) from companies or organizations. The Astronomical League is grateful for all that they do at making our avocation more rewarding.

The sponsors want League members to participate in and enjoy these very worthy programs. From the League's point of view, all the programs help make the organization more relevant by

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bringing different aspects of our hobby to you. From the sponsors' point of view, their sponsored programs encourage active participation in the field – participation which may benefit their own company or organization at some point in the future.

Remember, for the programs to be successful and for sponsorship to continue, Astro-Leaguers need to participate!

In 2018-2019, prizes and awards valued in excess of $2000 were "left on the table." AL clubs and members simply did not enter or nominate enough deserving, qualified people for all the various award programs and competitions. The result: Some allocated funds went unspent and un-awarded.

Remember, all these programs are here for you!

PAC OUTREACH EVENTS

Jan and I just finished a club outreach at C.R. Hanna Grade School in Orion (February 28th, 2020). 3 - Fifth Grade Classes - 73 4- First Grade Classed - 69. Total: 142. Constellations, stellar magnitude, colors of stars, mythological stories, etc.
Roy Gustafson

AWARDS

Awards Presented At The February Monthly Meeting

Wayland Bauer presented an award to Rusty Case (right) for completing the NCRAL Winter Seasonal Messier List. He was the 1st in the region to complete it.

Wayland Bauer presented an award to Al Sheidler (below) for completing the 2019 Astronomical League Mercury Transit Specialty Observing Award.

Astronomy Club Starts Public Viewing Season

by Dale Hachtel, Popular Astronomy Club

Niabi Zoo is home to more than 200 animal species, but Niabi's parking lot is used for an activity not related to animals. On the third Saturday of each month from March through November, the Popular Astronomy Club (PAC) hosts free viewing of the night skies. PAC will kick off its 2020 season on March 21 at sundown with opportunity to observe many interesting objects, depending on weather conditions. Guests may check the Popular Astronomy Club Facebook page to see if viewing will occur. Guests are invited to look through the Popular Astronomy Club Mobile Observatory (PACMO) telescope and member's telescopes. PAC members will be available to answer questions.

The Popular Astronomy Club Mobile Observatory (PACMO) will be at the Niabi Zoo parking lot on the third Saturday of each month from March through November for public viewing, weather permitting.

During March, the visible planets are above the horizon only for a brief time before sunrise, except for Venus. Venus is visible after sunset for a couple hours. Mercury, Mars, Jupiter, and Saturn aren't visible until shortly before sunrise. This year, from about March 13 to March 25, the moon is not interfering with viewing. It is a great time to look for the dimmer objects in the sky.

Brighter items are visible with the naked eye or binoculars. The dimmer items will be best viewed with a small telescope, or a larger telescope to observe their shape or resolve multiple stars in a cluster.

First, let's review some of the brighter items for orientation.

The planet Venus is in the west and following the sun to the horizon and is the brightest object in the night sky. To the left of Venus, in the southwest direction, is the constellation Orion, noted by the three stars in Orion's belt, and the bright star Betelgeuse above the belt. Looking to the left of Orion, is Sirius, the brightest star in the night sky. To the left of Betelgeuse and above and left of Sirius, is Procyon. These three stars (Betelgeuse, Sirius, and Procyon) are called the winter triangle and can be used to help locate other objects.

Looking high above the winter triangle, you will notice the two brightest stars in the constellation Gemini, Castor and Pollux, also known as the twins.

Now for the dimmer but very interesting objects in this area of the sky.

Below Orion's belt, you can see three stars, and a fuzzy object, which is the Great Orion Nebula, a region where new stars and planets are forming. Also in Orion, is the ghostly object M78, known as Casper the Friendly Ghost, looking down at us from the sky.

To the right of Orion, between Venus and Orion, a cluster of 6 or 7 visible stars forms the Pleiades in the constellation Taurus. These are new stars recently formed, and with larger telescopes, several

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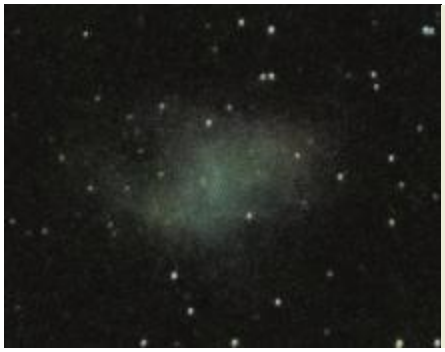
more stars can be seen in this cluster.
Also in Taurus, is the Crab Nebula (see picture), the remains of a supernova explosion.



The Crab Nebula is the remains of a supernova that was observed almost 1000 years ago.
Photo by Alan Sheidler

Other distant objects such as the Black Eye Galaxy also can be seen using the larger telescopes.
The best way to see these is to come to the March 21 public observing night with the PAC at the Niabi Zoo parking lot.
Each month will offer new and interesting deep sky objects, starting after the June observing date, the planets will move into the evening sky viewing time.

The Black Eye Galaxy, M64, is a spiral galaxy that can be seen with larger amateur telescopes.
Photo by Terry Dufek

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North Central Region of
the Astronomical League - NCRAL

Des Moines Astronomical Society
50th Anniversary Celebration

SAVE THE DATE AND PLAN TO ATTEND!

The Des Moines Astronomical Society with double dome observatory in Ashton Wildwood Park, Iowa, will be celebrating its Fiftieth Anniversary Friday-Saturday, June 27-28, 2020.

The celebration includes a banquet with a nationally known astronomer as a keynote speaker, a Star-B-Que at the observatory, and tours of the Ashton Observatory and Drake University Observatory in Des Moines. The anniversary celebration will be capped off with a gala Saturday night star party.

Watch the Spring 2020 issue of the NORTHERN LIGHTS newsletter for more information and an RSVP form.

PLACE THIS EVENT ON YOUR CALENDAR NOW AND STAY TUNED FOR DETAILS

Weird Object Mercury

No. 41: Odd Realm of Fire & Ice

By Bob Berman | Published: Friday, March 20, 2015

RELATED TOPICS: WEIRDEST OBJECTS | MERCURY

LOONY PLANET. Mercury's features superficially resemble the Moon's, but with some dramatic differences.

First Light

February 2020

Something old, something new…Eureka instead of Echo.

This is the story of my first telescope, of the comet it did not discover and which later collided with Jupiter, and the telescope that replaced it. Although this story has been building for almost sixty years, it came to a head last fall. First, in late October, I got myself a brand-new reflector telescope. It is a 12-inch diameter reflector, with a fast f/5 focal ratio, which means that at low power I can get well over a degree field of sky when I gaze through it. That means more than two Moon-diameters. I had some difficulty setting up the new telescope, and needed some help, but when it finally was ready, the views were a wonder to behold and a true joy.

I named the new telescope Eureka, after an asteroid I discovered, at Palomar with Henry Holt, in June of 1990. The asteroid turned out to be orbiting at the L5 point (LaGrangian 5) in Mars's orbit, as has been that way for much of the life of the solar system. The asteroid is the first known Martian trojan, and our proposed name, Eureka, was accepted as an expression of joy in making a discovery. It was named for Archimedes' expression of delight after discovering how objects displace water, and how he leapt out of his bathtub and ran down the street yelling Eureka! (There is nothing in the story that suggested that Archimedes bothered to dry off and dress before he darted outside.) For my new telescope Eureka's first light, (see last month's column) I chose Jupiter, which is my choice for first light objects ever since September 1, 1960.

That brings me to the second telescope, named Echo after a large passive communications satellite launched on August 12, 1960. Echo was my very first telescope, and it was the telescope through which I looked at Jupiter for the first time on that far-off night. On that distant night, Mom and Dad were with me and they were excited as well. An entirely new world was opening up for me, a world that has remained open and inviting ever since. For a few years it was my only telescope, replaced only when I upgraded to a 5-inch telescope while I was a patient at the Jewish National Home for Asthmatic Children in Denver, and an 8-inch a year later. Over the years Echo has provided a wealth of happy nights under the stars.

On Thursday evening, November 7, 2019, I formally donated Echo, my first telescope, to the Linda Hall Library of Science, Engineering, and Technology in Kansas City, along with more of my observing records. Echo began its new life that very evening. Under a clear sky, some people got the chance to look at the Moon through Echo, which still functions well after 59 years. May Echo get a lot of use at this wonderful library, one of the largest science libraries in the world.

All this brings me to the point of this article, that Eureka is instead of Echo. After all these years I wanted a powerful telescope to replace my first telescope. With Eureka, I now have that telescope. Every time I look through it, my mind is filled with the magic and delight of that long-gone evening when I first set up a telescope and looked at Jupiter. On that night I saw Jupiter, its belts, and its four big moons. One thing I did not see, and neither did anybody else, was a small comet moving close to the planet. That comet would remain undetected until March 23, 1993, when Gene and Carolyn Shoemaker and I set up a night's observing at Palomar that would include the field that revealed this comet. It was reported on the 25th. Sixteen months later, this comet, now known as Shoemaker-Levy 9, collided with Jupiter in the most dramatic explosions ever witnessed by humanity. May Eureka, instead of Echo, also reach for the stars.

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UPCOMING EVENTS

March 9th, 2019

Event: PAC business meeting
Location: Butterworth Center at 7:00 PM.
Constellation Report : Jan Gustafson
Program: SMORGASBORD

map of Butterworth Center complex. We are in building B

- **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 9th, 2020** Illiniwek Campground 6:00 pm (rain date May 23rd)
- **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 **program:** Mr. Dick Koos, "Go For Landing". Mr. Koos will discuss his NASA work with program alarm simulation and it's influence on Apollo 11.
- **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.

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

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

SIGN UP REPORT

MONTH	NEWSPAPER ARTICLES	CONSTELLATION REPORT	PROGRAM
MAR 2020	Dale and Joanne Hachtel	Jan Gustafson	SMORGASBORD (SEE BELOW)
APR 2020	Jeff Struve	Frank Stonestreet	Mr. Jim Dole & Mr. Tom Dunmore, Firebaugh Observatory
MAY 2020	Dino Milani	Roberta Wright	Ian Spangenberg
JUNE 2020	Terry Dufek	Anne Bauer	SMORGASBORD (SEE BELOW)
JULY 2020	Jeff Struve		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			
DEC 2020	Terry Dufek		
JAN 2021			
FEB 2021			

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

SMORGASBORD

MARCH

Roberta Wright (Moondust) — Terry Dufek (PAC &Facebook)

Anne Bauer (2 min. Style Show)

JUNE

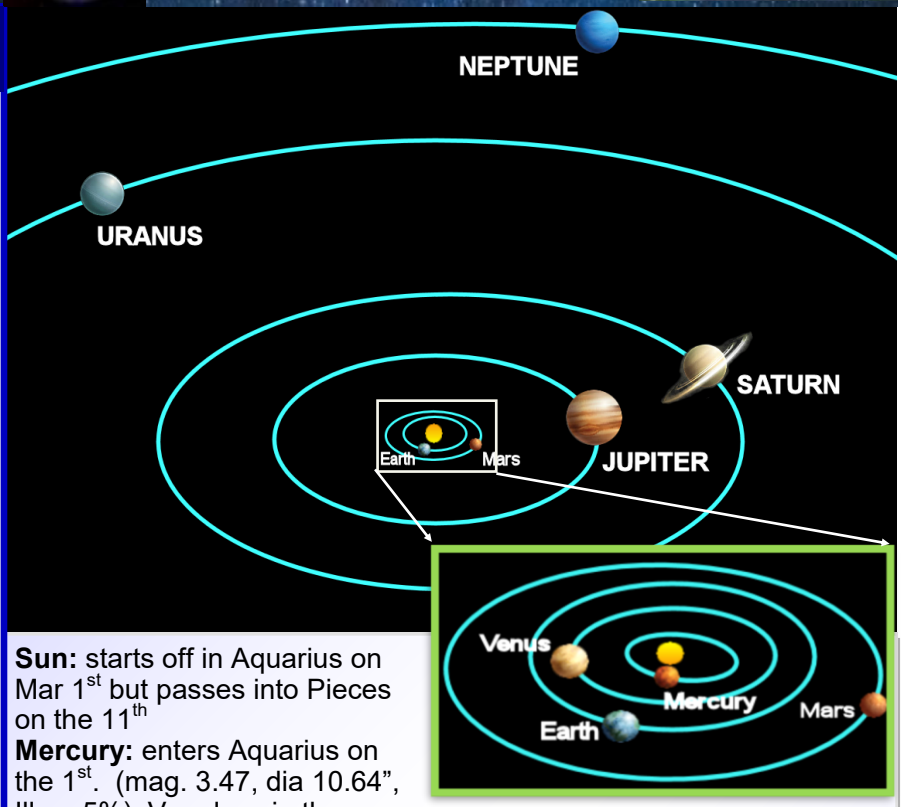
SEPTEMBER

ASTRONOMICAL CALENDAR OF EVENTS

(CST) adjusted for Daylight Savings Time when applicable

Mar 02 09:16 Aldebaran 3.3°S of Moon
Mar 02 13:57 **FIRST QUARTER MOON**
Mar 04 08:58 Moon at Ascending Node
Mar 05 17:26 Pollux 5.2°N of Moon
Mar 06 15:08 Beehive 1.1°S of Moon
Mar 08:20:00 **daylight savings time starts**
Mar 08 03:23 Regulus 3.8°S of Moon
Mar 08 07 00 Neptune in Conjunction with Sun
Mar 09 12:48 **FULL MOON**
Mar 10 01:33 Moon at Perigee: 357123 km
Mar 16 04:34 **LAST QUARTER MOON**
Mar 16 20:00 Moon at Descending Node
Mar 18 03 19 Mars 0.7°N of Moon:
Mar 18 05:18 Jupiter 1.5°N of Moon
Mar 18 19:04 Saturn 2.1°N of Moon
Mar 19 22:50 Vernal Equinox
Mar 19 23 00 Venus at Perihelion
Mar 21 12:48 Mercury 3.6°N of Moon
Mar 23 21 00 Mercury at Greatest Elongation: 27.8°W
Mar 24 04:28 **NEW MOON**
Mar 24 10:23 Moon at Apogee: 406690 km
Mar 24 17 00 Venus at Greatest Elongation 46.1°E
Mar 27 00 00 Mercury at Aphelion
Mar 29 16:52 Aldebaran 3.6°S of Moon
Mar 31 11:51 Moon at Ascending Node

THE PLANETS March 2020



Sun: starts off in Aquarius on Mar 1st but passes into Pieces on the 11th

Mercury: enters Aquarius on the 1st. (mag. 3.47, dia 10.64", Illum 5%) Very low, in the morning sky, it is about 7º off the E-SE horizon at sunrise. By the 31st, It is about 8 ½ º above the E-SE horizon at 6:45 am. The 27 old Moon is about 5º away from it on the 21st. Very tough viewing all month.

Venus is in the evening sky on the 1st. It is in Pieces. (Mag. -4.30, Dia. 18.93", Illum 62.3%) It is a spectacular sight in the evening sky at 39º above the SW-W horizon. On the 27th, the 3.2-day old Moon passes by on the south. By the end of the month it grows steadily larger to almost 26" and brightens to mag. -4.55. Now is the best time to view! On the 8th, Venus passes 2º 12' by Uranus.

Mars is in Sagittarius, in the early morning sky on the 1st. Mars is mag 1.11, dia. 5.48", Illum 90% By the 31st it has brightened to mag .79, dia has grown to 6.39". The red planet is 17º above the SE horizon at 6:00 am on the 1st. It slowly drifts eastward thru the month until it is 1º 13' from Jupiter on the 18th. It forms a nice conjunction with the Moon also (see Skyview). Saturn is just 6º toward the east. Mars continues to march east until on the 20th, it is 45' from Jupiter. From there it approaches a conjunction with Saturn on the 31st with a separation of 45' (see Skyview). Many nice photographic opportunities.

Jupiter is in Sagittarius on the 1st. 7º above the SE horizon at 5:30 am. (mag -1.97. dia 34.15") Mars is very close on the 20th (see above). Brightens to -2.14 by month end.

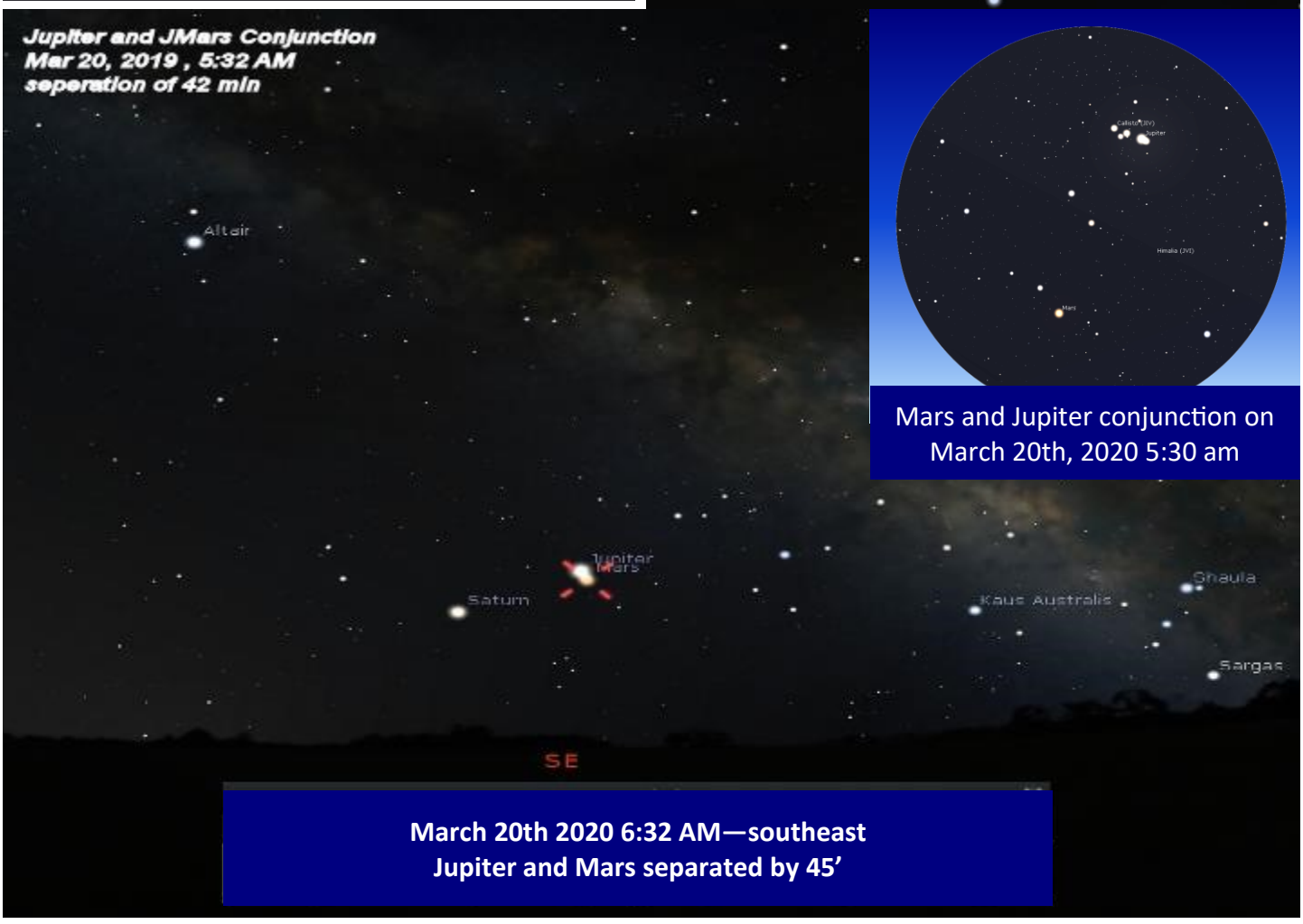
Saturn is in Sagittarius on the 1st but moves into Capricorn on the 21st (mag. .66, dia 15.49" (rings 36"). Mars is very close on the 31st (58').

Uranus is in Aries on the 1st (mag. 5.85, 3.45"). on the 7th, it is 2º 17' to the left of Venus.

Neptune is in Aquarius on the 1st. (mag. 7.96, 2.21") It is too close to the Sun in the evening sky. It reaches conjunction on the 8th.

March 18th 2020 5:30 AM—southeast

March 6th 2020 6:00 pm

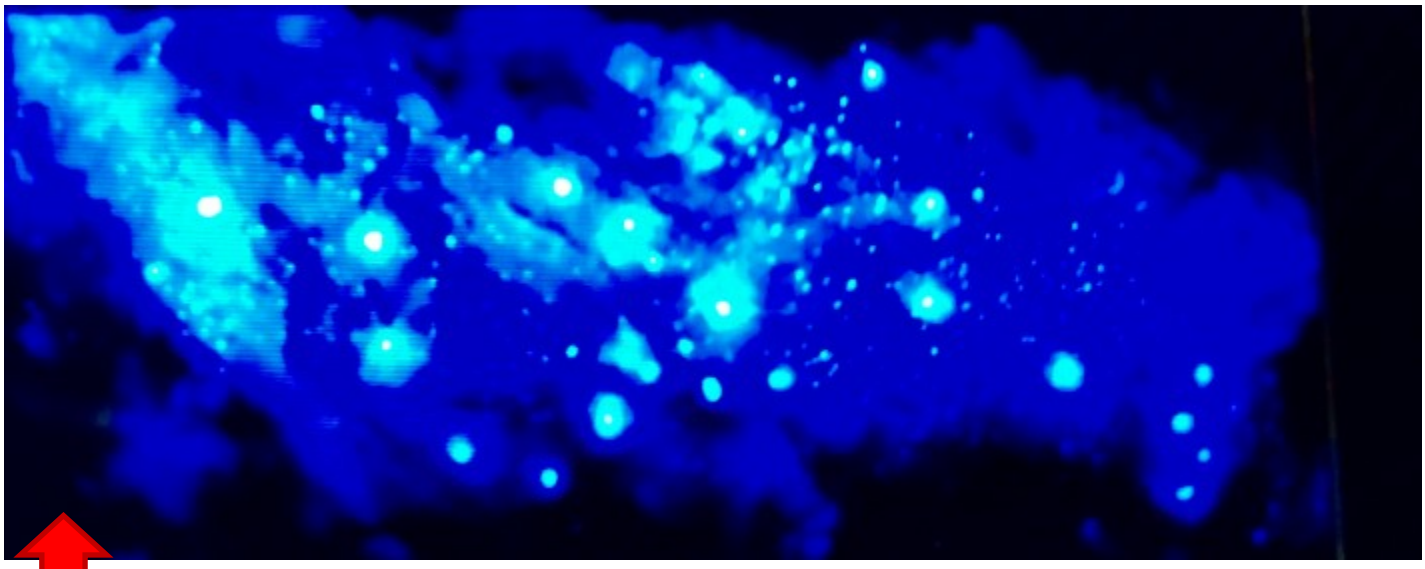


Mars and Jupiter conjunction on March 20th, 2020 5:30 am

March 20th 2020 6:32 AM—southeast
Jupiter and Mars separated by 45’

Venus located in the Pleiades on April 3rd, 2020

Mars and Saturn on March 31st at 5:30 am.

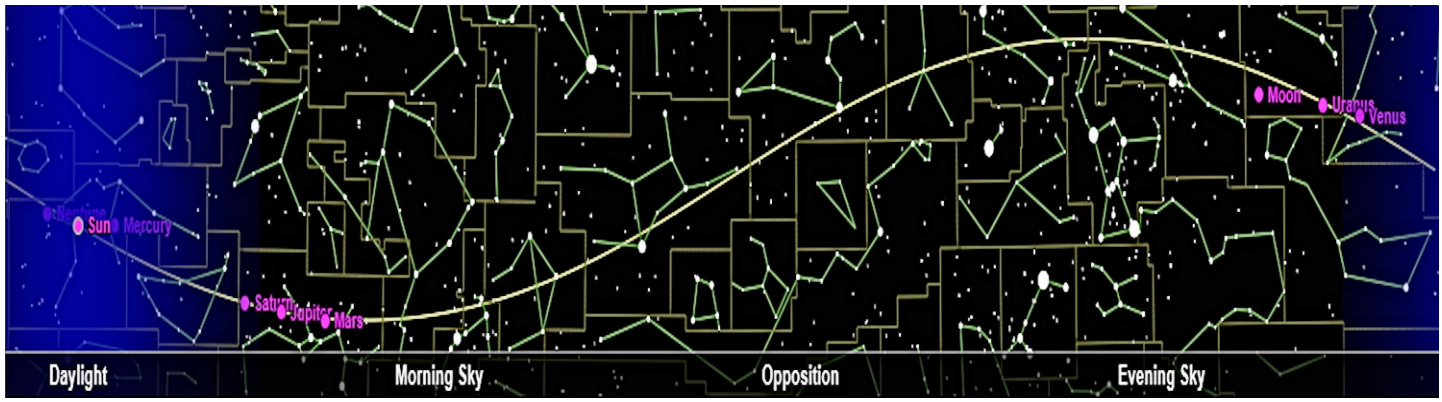


Can you believe the Night Sky in New Zealand?

Actually this is in a cave with glow worms! In some places one could see some constellation patterns - Orion, Cepheus, Cassiopeia, Big Dipper, Southern Cross, and others. Just the way they arranged their spot on the ceiling of the cave! Just thought I would share this remarkable resemblance to the real sky. And, this wasn't my picture it was theirs, you can't use cameras in the cave. They used a long time exposure to get this but in reality they looked like dots of light just like real stars!
Photographed with my Sony camera and transferred to my iPhone and sent out.
Roy Gustafson

Planetary Alignments in March 2020

Event	Date and Time	Object 1	Object 2	Separation	Solar Elongation	Lunar Elongation
Occultation	2020-03-05 22:58:18	Jupiter	Callisto (JIV)	—	+55°36'12.4"	+173°14'44.8"
Occultation	2020-03-07 20:25:41	Jupiter	Io (JI)	—	+57°10'02.0"	+145°16'59.5"
Conjunction	2020-03-08 07:31:59	Neptune	Sun	+1°00'50.6"	—	+162°09'18.6"
Occultation	2020-03-09 08:05:38	Jupiter	Europa (JII)	—	+58°21'57.7"	+124°45'52.8"
Transit	2020-03-14 08:00:28	Jupiter	Callisto (JIV)	—	+62°31'21.6"	+51°07'11.3"
Transit	2020-03-15 20:32:46	Jupiter	Io (JI)	—	+63°47'34.0"	+29°59'07.4"
Conjunction	2020-03-18 01:47:27	Moon	Mars	+1°16'51.8"	+67°08'24.6"	—
Conjunction	2020-03-18 03:44:10	Moon	Jupiter	+2°12'07.0"	+66°13'45.9"	—
Conjunction	2020-03-18 20:02:55	Moon	Saturn	+2°22'13.9"	+59°20'10.3"	—
Conjunction	2020-03-20 05:34:24	Jupiter	Mars	+0°42'29.9"	+67°28'28.2"	+24°54'18.0"
Conjunction	2020-03-20 08:53:33	Moon	(1) Ceres	+1°49'11.5"	+41°55'52.9"	—
Conjunction	2020-03-21 17:50:44	Moon	Mercury	+3°42'44.4"	+27°50'53.4"	—
Occultation	2020-03-22 19:29:05	Jupiter	Callisto (JIV)	—	+69°39'14.0"	+54°01'54.0"
Conjunction	2020-03-22 22:05:16	Moon	Neptune	+4°07'22.2"	+15°12'31.3"	—
Transit	2020-03-22 22:28:51	Jupiter	Io (JI)	—	+69°45'36.4"	+55°48'27.8"
Conjunction	2020-03-23 00:18:23	Mars	Pluto	+0°00'45.1"	+68°19'35.4"	+55°24'18.3"
Conjunction	2020-03-26 20:18:23	Moon	Uranus	+4°04'31.3"	+28°28'32.3"	—
Occultation	2020-03-27 02:53:48	Jupiter	Europa (JII)	—	+73°19'28.5"	+104°57'19.6"
Occultation	2020-03-28 10:38:12	Jupiter	Ganymede (JIII)	—	+74°27'27.1"	+121°26'09.4"
Conjunction	2020-03-28 11:33:52	Moon	Venus	+7°12'53.9"	+47°34'29.1"	—
Occultation	2020-03-30 21:45:45	Jupiter	Io (JI)	—	+76°34'17.1"	+150°22'26.3"



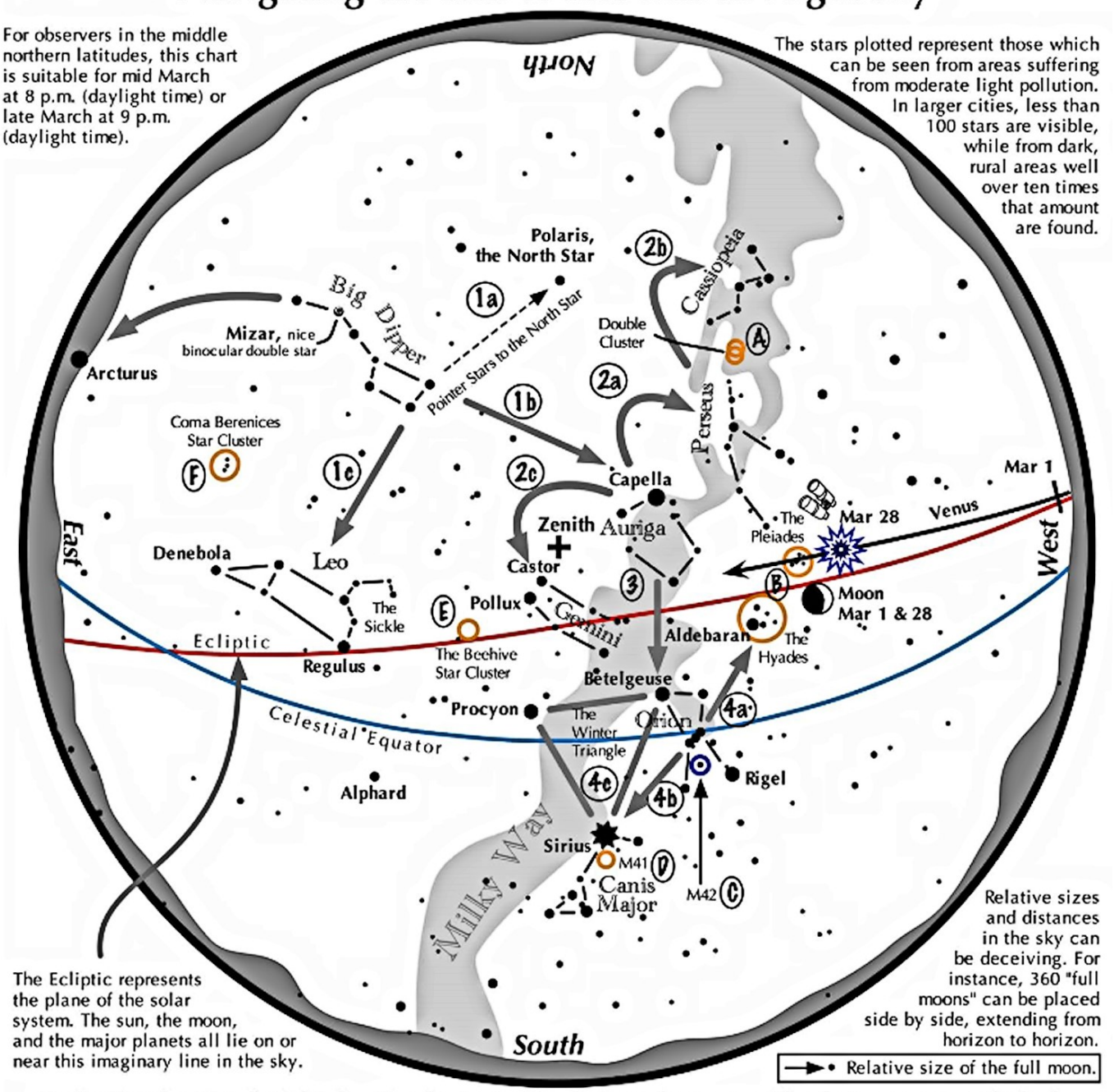
DEEP SKY WONDERS

For March Evening Skies

Name	RA (J2000)	Dec (J2000)	Mag.	A.S., '	S.B.	Transit	Type
NGC 1647 (Pirate Moon Cluster)	4h45m55.0s	+19°06'54.0"	6.91	40.000	14.66	18h10m	open star cluster
NGC 1664 (4-H cluster)	4h51m06.0s	+43°40'30.0"	7.86	15.000	13.48	18h16m	open star cluster
NGC 1807 (Poor Man's Double Cluster)	5h10m48.7s	+16°31'19.2"	7.43	17.000	13.32	18h35m	open star cluster
NGC 1817 (Poor Man's Double Cluster)	5h12m15.1s	+16°41'24.0"	8.12	16.000	13.88	18h36m	open star cluster
M 38 (Starfish Cluster)	5h28m43.0s	+35°51'18.0"	6.64	15.000	12.26	18h53m	open star cluster
NGC 1907	5h28m05.0s	+35°19'30.0"	8.45	5.000	11.68	18h53m	open star cluster
M 42 (Great Orion Nebula)	5h35m17.3s	-5°23'28.0"	4.94	150.000	14.01	18h59m	HII region
M 1 (Crab Nebula)	5h34m31.9s	+22°00'52.2"	8.70	12.000	12.20	18h59m	supernova remnant
NGC 1980 (The Lost Jewel of Orion)	5h35m24.0s	-5°54'54.0"	3.48	420.000	14.80	19h00m	star cluster
M 36 (Pinwheel Cluster)	5h36m18.0s	+34°08'24.0"	6.24	10.000	10.98	19h01m	open star cluster
M 78 (Casper the Friendly Ghost Nebula)	5h46m46.8s	+0°00'50.4"	8.85	14.000	12.80	19h11m	reflection nebula
M 37 (January Salt-and-Pepper Cluster)	5h52m18.0s	+32°33'10.8"	5.83	15.000	11.45	19h17m	open star cluster
M 35 (Shoe-Buckle Cluster)	6h08m54.0s	+24°19'58.8"	5.34	25.000	12.07	19h33m	open star cluster
NGC 2169 (The 37 Cluster)	6h08m24.0s	+13°59'24.0"	6.19	6.000	9.82	19h33m	open star cluster
NGC 2194 (Intergalactic Wanderer)	6h13m46.1s	+12°49'04.8"	8.79	5.000	12.02	19h38m	open star cluster
NGC 2232 (Double Wedge Cluster)	6h27m15.1s	-4°45'28.8"	4.34	29.000	11.39	19h52m	open star cluster
NGC 2244 (Rosette Nebula)	6h31m55.0s	+4°56'31.2"	5.11	24.000	11.75	19h56m	open star cluster
NGC 2264 (Christmas Tree Cluster)	6h40m58.1s	+9°53'42.0"	4.16	17.000	8.51	20h05m	open star cluster
M 41 (Little Beehive Cluster)	6h46m01.0s	-20°45'25.2"	5.37	39.000	13.06	20h10m	open star cluster
NGC 2281 (Broken Heart Cluster)	6h48m17.0s	+41°04'40.8"	5.57	15.000	11.19	20h13m	open star cluster
NGC 2301 (Hagrid's Dragon Cluster)	6h51m45.1s	+0°27'36.0"	6.30	15.000	11.92	20h16m	open star cluster
M 50 (Heart-Shaped Cluster)	7h02m47.5s	-8°20'16.1"	6.27	15.000	11.89	20h27m	open star cluster
NGC 2343 (Doublemint Cluster)	7h08m06.0s	-10°37'01.2"	7.09	6.000	10.72	20h32m	open star cluster
NGC 2353 (Avery's Island)	7h14m30.0s	-10°16'01.2"	7.47	20.000	13.71	20h39m	open star cluster
NGC 2360 (Caroline's Cluster)	7h17m43.0s	-15°38'31.2"	7.64	14.000	13.11	20h42m	open star cluster
NGC 2362 (τ CMa Cluster)	7h18m41.0s	-24°57'18.0"	4.87	8.000	9.12	20h43m	open star cluster
NGC 2367 (Charlie Brown's Christmas Tree)	7h20m06.0s	-21°52'55.2"	8.51	3.500	10.97	20h44m	open star cluster
NGC 2409 (Firsse 213)	7h31m37.0s	-17°11'34.8"	7.73	32.000	13.48	20h56m	cluster with nebulosity
M 47	7h36m35.0s	-14°28'58.8"	4.77	25.000	11.50	21h01m	open star cluster
NGC 2421	7h36m12.0s	-20°37'12.0"	8.79	8.000	13.04	21h01m	open star cluster
NGC 2420 (Twinkling Comet Cluster)	7h38m23.0s	+21°34'22.8"	8.47	7.000	12.44	21h03m	open star cluster
M 46	7h41m46.1s	-14°48'36.0"	6.46	20.000	12.71	21h06m	open star cluster
M 93 (Butterfly Cluster)	7h44m30.0s	-23°51'25.2"	6.75	10.000	11.48	21h09m	open star cluster
NGC 2477 (Electric Guitar Cluster)	7h52m10.1s	-38°31'48.0"	8.39	27.000	15.29	21h16m	open star cluster
NGC 2539 (The Dish Cluster)	8h10m37.0s	-12°49'04.8"	6.79	21.000	13.14	21h35m	open star cluster
NGC 2546 (Heart and Dagger Cluster)	8h12m14.9s	-37°35'42.0"	7.78	40.000	15.52	21h37m	open star cluster
M 48 (Beehive Cluster)	8h13m43.0s	-5°45'00.0"	6.04	30.000	13.16	21h38m	open star cluster
M 44 (Beehive Cluster)	8h40m24.0s	+19°40'01.2"	3.25	70.000	12.22	22h05m	open star cluster
M 67 (Golden-Eye Cluster)	8h51m18.0s	+11°48'00.0"	7.06	25.000	13.79	22h16m	open star cluster
NGC 2818	9h16m01.7s	-36°37'38.8"	8.95	1.334	7.80	22h41m	planetary nebula
M 81 (Bode's Galaxy)	9h55m33.2s	+69°03'55.1"	7.09	41.000	13.27	23h21m	galaxy

** Data from Stellarium*

Navigating the mid to late March Night Sky



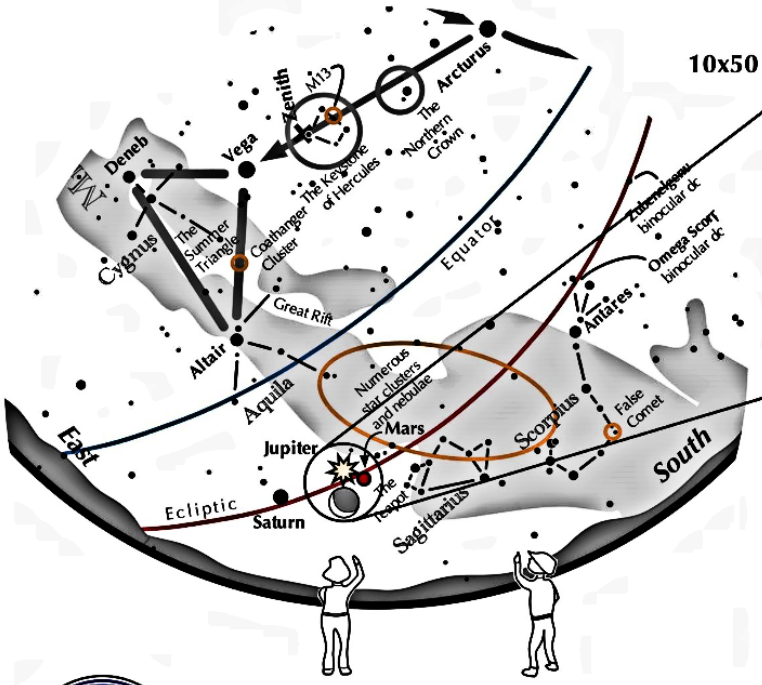
Navigating the March night sky: Simply start with what you know or with what you can easily find.

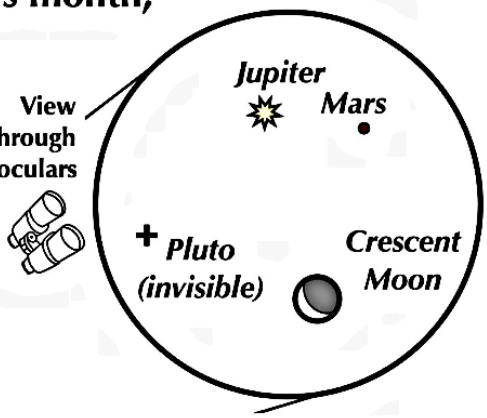
1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star. Its top bowl stars point west to Capella in Auriga, nearly overhead. Leo reclines below the Dipper's bowl.
2. From Capella jump northwestward along the Milky Way to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from Capella to the twin stars of Castor and Pollux in 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 northwest to the red star Aldebaran and the Hyades star cluster, then to the Pleiades star cluster. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius. It is a member of the Winter Triangle.

Binocular Highlights

A: Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** M42 in Orion is a star forming nebula. **D:** Look south of Sirius for the star cluster M41. **E:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. **F:** Look high in the east for the loose star cluster of Coma Berenices.

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





Southeast 90 minutes before sunrise March 18

The Scene: Celestial Trio

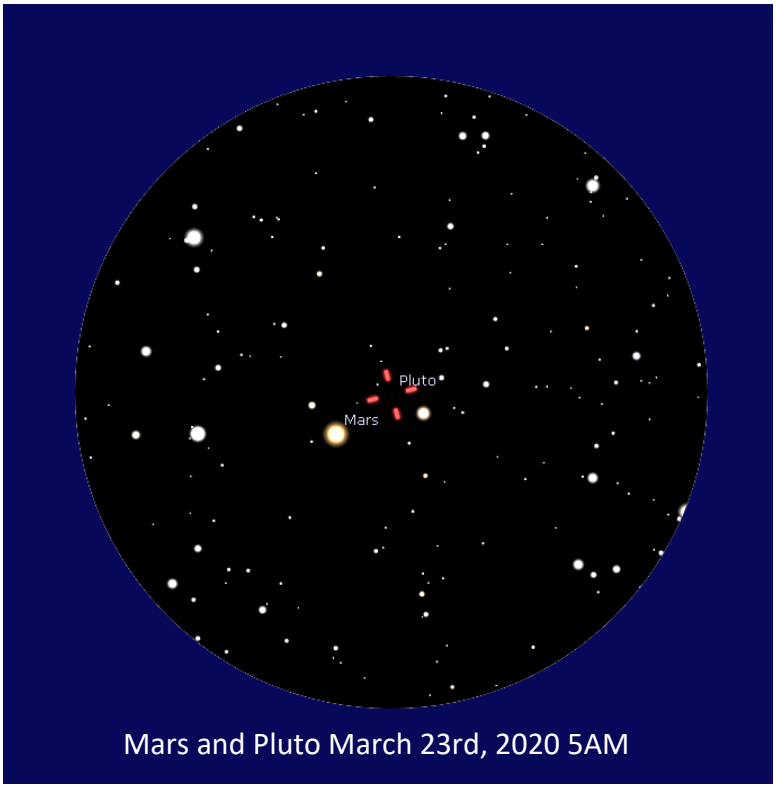
Look to the southeast 90 minutes before sunrise on March 18.

- Low in the southeast glows the thin crescent Moon seemingly full of Earthshine.
- The bright star-like object above it is Jupiter.
- The much dimmer object to the right of Jupiter is Mars.
- For a better view, aim binoculars at the trio.
- To their far left is Saturn, brighter than Mars, but dimmer than Jupiter.
- Forming another triangle, this time to the Moon's and Jupiter's left is invisible Pluto! Sorry, Binoculars will NOT be able to spot it.

Close approach of Mars and Pluto

MON, 23 MAR 2020 AT 10:09 CDT

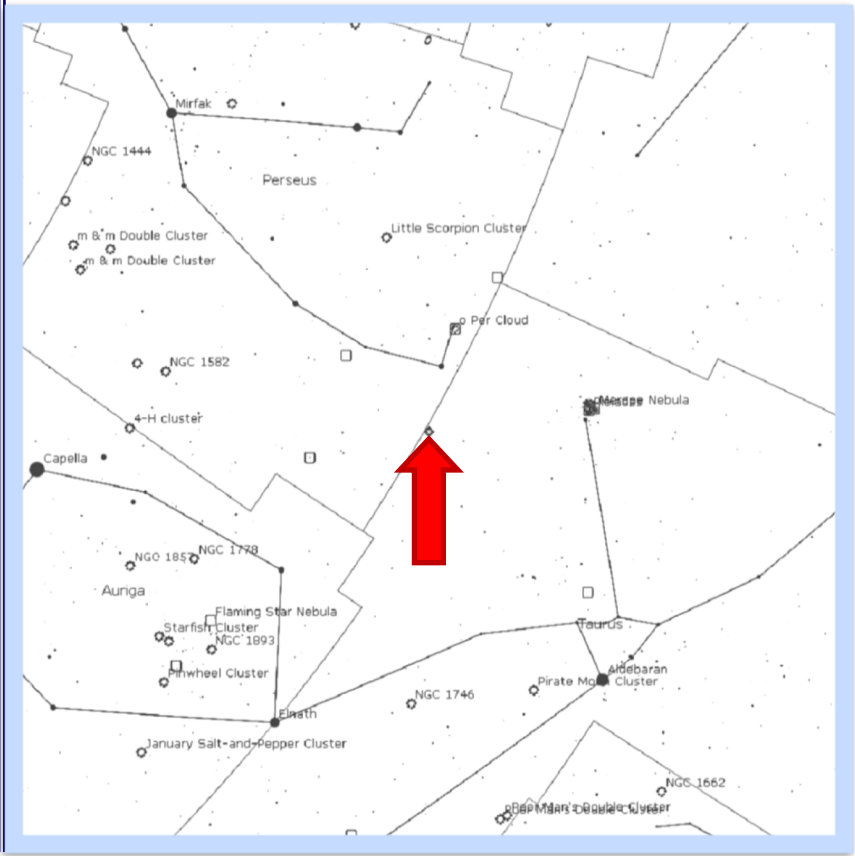
Mars and 134340 Pluto will make a close approach, passing within 0°08' of each other. From Davenport, the pair will be difficult to observe as they will appear no higher than 18° above the horizon. They will be visible in the dawn sky, rising at 04:04 (CST) – 2 hours and 56 minutes before the Sun – and reaching an altitude of 18° above the south-eastern horizon before fading from view as dawn breaks around 06:22. Mars will be at mag 0.9; and 134340 Pluto will be at mag 15.1. Both objects will lie in the constellation Sagittarius.



Mars and Pluto March 23rd, 2020 5AM

Spotlight: NGC 1514– Crystal Ball Nebula

- NGC 1514 is a planetary nebula that was discovered by William Herschel on November 13, 1790
- Before the discovery of NGC 1514, Herschel had believed that nebulae were really densely grouped stars too distant to be resolved in a telescope.
- NGC 1514 made him rethink his beliefs. He described the nebula as a “most singular phenomenon,” noting that “the nebulosity about the star is not of a starry nature.”
- a planetary nebula located in the constellation Taurus, near the border with Perseus.
- It has an apparent magnitude of 9.43 and lies at an approximate distance of 2,200 light years (700 parsecs) from Earth.
- It occupies an area of 2.2 arc minutes
- Gas is presumably expanding away from the larger stellar component
- The estimated expansion rate of NGC 1514 is 25 km/s
- Astronomers have proposed that the nebula surrounds a binary star in a close orbit with a period of 4 to 9 days.
- The larger primary component in the system is believed to be the source of the expanding gas
- The nebula’s rings, which cannot be seen in visible light, were only discovered in the last decade



This article is distributed by NASA Night Sky Network
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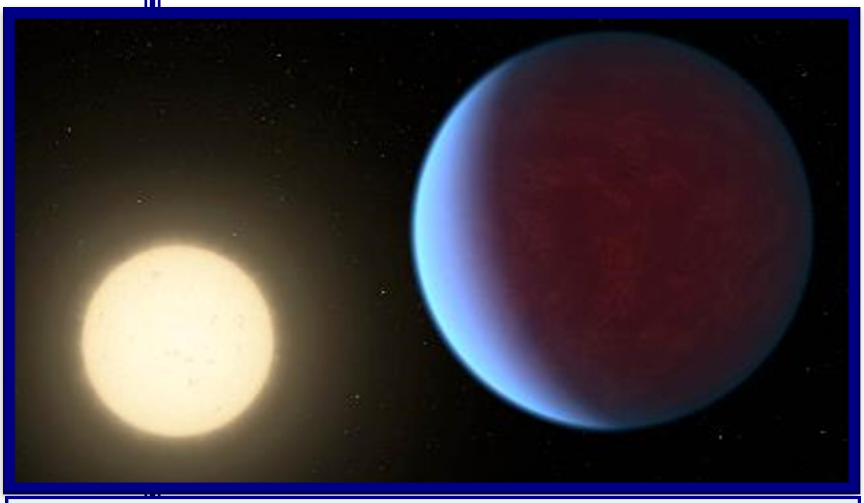
Dim Delights in Cancer

David Prosper

Cancer the Crab is a dim constellation, yet it contains one of the most beautiful and easy-to-spot star clusters in our sky: the **Beehive Cluster**. Cancer also possesses one of the most studied exoplanets: the superhot super-Earth, **55 Cancri e**. Find **Cancer's** dim stars by looking in between the brighter neighboring constellations of Gemini and Leo. Don't get frustrated if you can't find it at first, since Cancer isn't easily visible from moderately light polluted areas. Once you find Cancer, look for its most famous deep-sky object: the **Beehive Cluster**! It's a large open cluster of young stars, three times larger than our Moon in the sky. The Beehive is visible to unaided eyes under good sky conditions as a faint cloudy patch, but is stunning when viewed through binoculars or a wide-field telescope. It was one of the earliest deep-sky objects noticed by ancient astronomers, and so the Beehive has many other names, including Praesepe, Nubilum, M44, the Ghost, and Jishi qi. Take a look at it on a clear night through binoculars. Do these stars look like a hive of buzzing bees? Or do you see something else? There's no wrong answer, since this large star cluster has intrigued imaginative observers for thousands of years.

55 Cancri is a nearby binary star system, about 41 light years from us and faintly visible under excellent dark sky conditions. The larger star is orbited by at least five planets including **55 Cancri e**, (a.k.a. Janssen, named after one of the first telescope makers). Janssen is a "super-earth," a large rocky world 8 times the mass of our Earth, and orbits its star every 18 hours, giving it one of the shortest years of all known planets! Janssen was the first exoplanet to have its atmosphere successfully analyzed. Both the Hubble and recently-retired Spitzer space telescopes confirmed that the hot world is enveloped by an atmosphere of helium and hydrogen with traces of hydrogen cyanide: not a likely place to find life, especially since the surface is probably scorching hot rock. The NASA Exoplanet Catalog has more details about this and many other exoplanets at bit.ly/nasa55cancrie.



Artist concept of 55 Cancri e orbiting its nearby host star. Find details from the Spitzer Space Telescope's close study of its atmosphere at: bit.ly/spitzer55cancrie and the Hubble Space Telescope's observations at bit.ly/hubble55cancrie Credit: NASA/JPL-Caltech

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Dim Delights in Cancer

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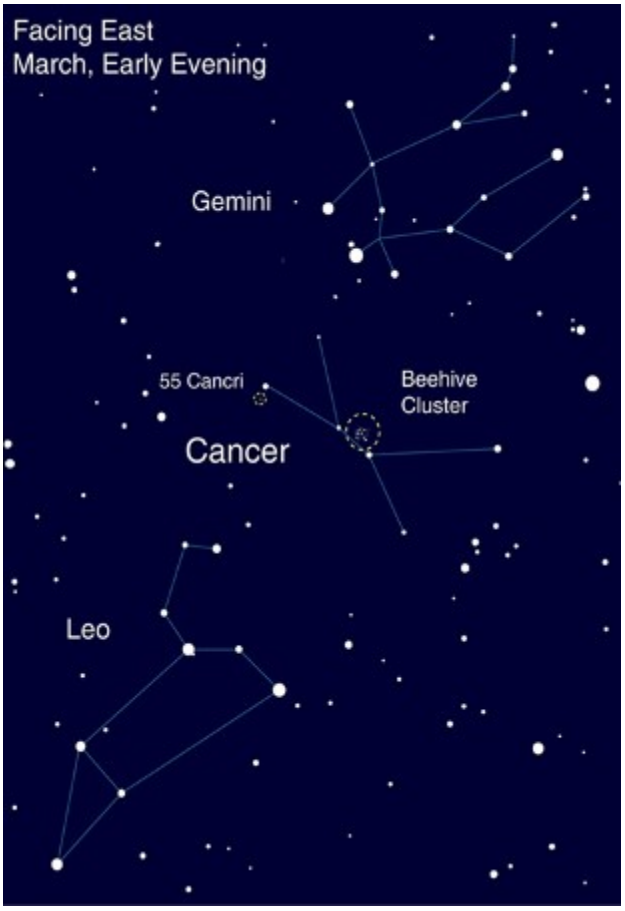
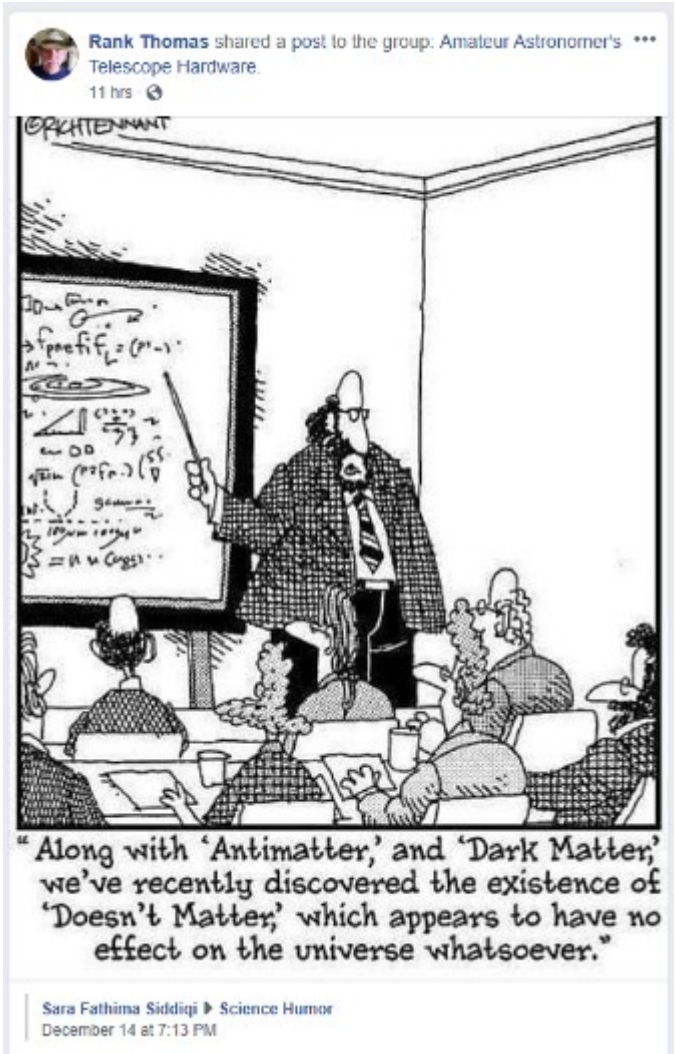
How do astronomers find planets around other star systems? The Night Sky Network's "How We Find Planets" activity helps demonstrate both the transit and wobble methods of exoplanet detection: bit.ly/findplanets. Notably, 55 Cancri e was discovered via the wobble method in 2004, and then the transit method confirmed the planet's orbital period in 2011!

Want to learn more about exoplanets? Get the latest NASA news about worlds beyond our solar system at nasa.gov.



Look for Cancer in between the "Sickle" or "Question Mark" of Leo and the bright twin stars of Gemini. You can't see the planets around 55 Cancri, but if skies are dark enough you can see the star itself. Can you see the Beehive Cluster?

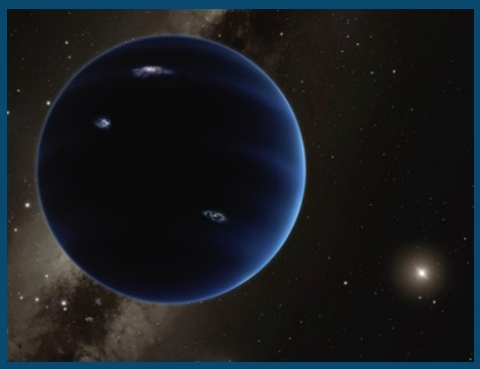


NEWSLINKS

In pursuit of Planet Nine

January 3rd, 2020

CLICK HERE for link to News Article



NASA's exoplanet-hunting TESS space telescope moonlights in studying stars

CLICK HERE for link to News Article

Sun science rises with new trove of Parker Solar Probe studies

February 7th, 2020

CLICK HERE for link to News Article

A Meteor Smashed Into Mars in 2005, Making this Crater

February 6th, 2020

CLICK HERE for link to News Article

NEWSLINKS

Astronomers Find Ultra massive Galaxy From The Early Universe That Suddenly Died

February 7th, 2020

CLICK HERE for link to News Article

Pluto's Icy Heart "Beats," Driving Planet-Scale Winds

February 7th, 2020

CLICK HERE for link to News Article

Simulations of early impacts produce a mixed Mars mantle

February 12th, 2020

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ESO telescope sees surface of dim Betelgeuse

February 14th, 2020

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NEWSLINKS

Pluto at 90

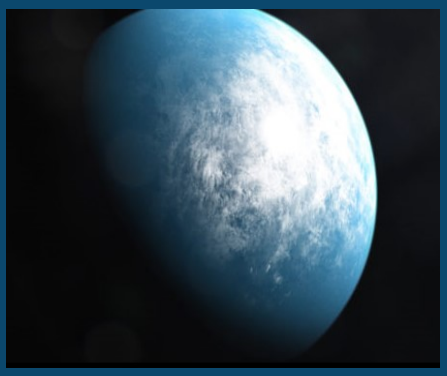
February 18th, 2020

CLICK HERE for link to News Article

The TESS Mission's First Earth-Like Planet Found in an Interesting Trio

February 18th, 2020

CLICK HERE for link to News Article



Meet the unknown female mathematician whose calculations helped discover Pluto

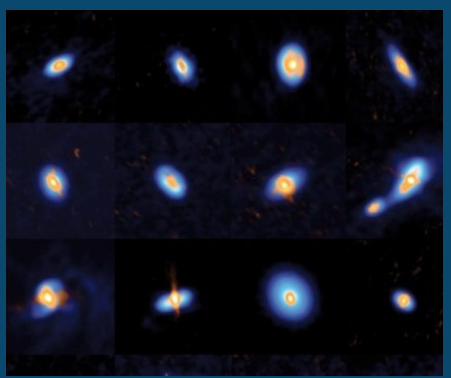
February 18th, 2020

CLICK HERE for link to News Article

Radio telescopes team up to unveil hundreds of protostars in Orion

February 21st, 2020

CLICK HERE for link to News Article



NEWSLINKS

Earth formed much faster than previously thought, new study shows

February 20th, 2020

CLICK HERE for link to News Article

Beyond the brim, Sombrero Galaxy's halo suggests turbulent past

February 20th, 2020

CLICK HERE for link to News Article

18-hour year planet on edge of destruction

February 20th, 2020

CLICK HERE for link to News Article

Gemini South telescope captures exquisite planetary nebula

February 20th, 2020

CLICK HERE for link to News Article

MEMBER OBSERVATIONS

Photos by Byron Davies using his Celestron 8" Edge HD 2032mm F/10 along with Backyard EOS software with his Canon 3Ti on February 22nd, 2020

M35 LIGHT 25sec 1600iso +10c_20200222-21h42m30s580ms

M36 LIGHT 30sec 1600iso +10c_20200222-21h40m29s812ms (2)

M37 LIGHT 30sec 1600iso +10c_20200222-21h31m23s348ms (2)

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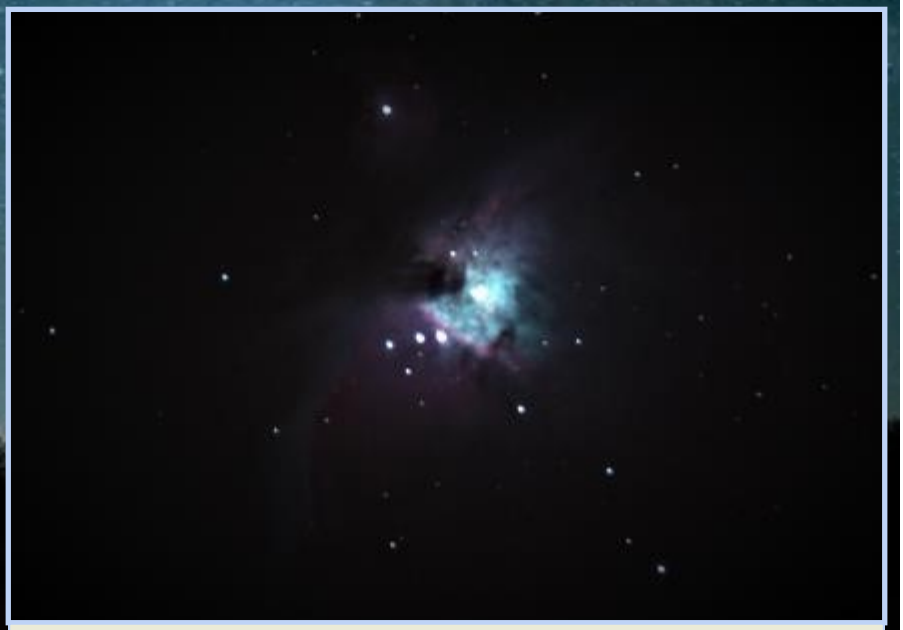
MEMBER OBSERVATIONS

M38 LIGHT 30sec 1600iso +10c_20200222-21h37m40s622ms (2)

Eskimo Nebula NGC2392 LIGHT 25sec 1600iso +9c_20200222-

M82 LIGHT 45sec 1600iso +9c_20200222-21h19m11s351ms



Orion Nebula M42 LIGHT_20sec 1600iso +11c_20200222-20h12m52s578ms (2)

Paul Castle Observing Session

February 21st, 2020

An observing session was held at Paul Castle Observatory on the 21st. The main goal was to complete the Winter NCRAL Messier list which was completed by Alex Holt, Al Sheidler and Terry Dufek. Also present was Mary and Hugh Holt, with Tim Holt arriving later with cocoa. A charcoal grill was lit to provide some heat. Byron Davies was also present and had some spectacular images with his R2 camera. The Orion Nebula was particularly beautiful. The wind never let up but the group kept on until about 9:30 pm.

Notes from Al:

Last night Byron Davies, Terry Dufek, Alex Holt, Hugh Holt, Mary Holt and Al Sheidler met at the Paul Castle Observatory to view the objects listed in the NCRAL Winter Seasonal Messier Marathon list of 27 objects. To my knowledge three of us were able to complete the observations and will be sending them in for validation. Congratulations to those intrepid individuals who braved the winter chill and persevered! Thanks. Al.

Group Photo out a cold observing session at Paul Castle on February 22nd, 2020. (Left to right) Al Sheidler, Alex, Mary and Hugh Holt, Byron Davies and Terry Dufek. Venus is in the upper right. Tim Holt arrived later.

(continued on next page)

Paul Castle Observing Sessions

Al took a wide sky shot centered on Orion, You will have to enlarge but there is a lot of detail there.

Al Sheidler , completing the NCRAL winter survey, was focused on the Orion Nebula

President Alan Sheidler called the February monthly meeting of the Popular Astronomy Club to order at the Butterworth Center at 7:00 p.m. local time, on February 10th, 2020. We had 20 members attending and no guests.

Observations:

Wayland Bauer reported seeing the space station on Friday evening.

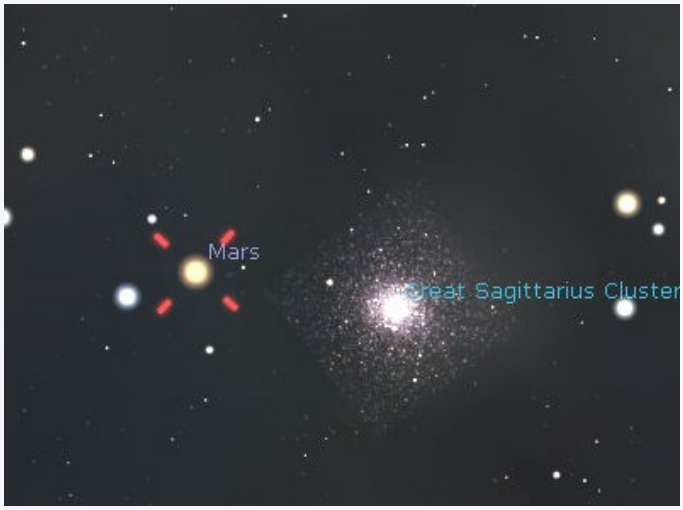
Terry Dufek commented on how bright and high Venus is in the evening sky.

Observing Opportunities:

The Mars Occultation is coming up on March 18th.

Venus will be in the Pleiades (M45) on April 3rd.

Mars will pass by M22 on February 29th, 2020 by 29'



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Outreach Request Review

Wayland Bauer reports a possible outreach opportunity.

Paul Castle renewal project:

Rusty, Dale, and Al will go on February 12th at 2 pm to check out the facilities, review and solidify the deal with Jackson Auto Body for recoating the dome for the observatory. The price submitted by the company was for $2400. A question was brought up about purchasing and installing the dome opener. The dome opener would be installed afterwards.

Awards

Wayland Bauer presented an award to Rusty Case for completing the NCRAL Winter Seasonal Messier List. He was the 1st in the region to complete it.

Wayland Bauer presented an award to Al Sheidler for completing the 2019 Astronomical League Mercury Transit Specialty Observing Award.

Constellation Report

A constellation report was presented by Paul Levesque on the constellation Monoceros

Program

A program was presented by Terry Dufek on Globular Clusters

Signup Sheets

Signup Sheets were reviewed for participation opportunities.

A list of constellations that have been reported on will be sent out by the secretary

The meeting was adjourned