

The Prairie Astronomer

July 2020 Volume 61, Issue #7

July Program: Active Galactic Nuclei
Martin Gaskell



NEOWISE!



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer



NEXT MEETING AND PROGRAM

July 28, 7:30pm via Zoom

Program: Active Galactic Nuclei

Martin Gaskell
Dept. Astronomy and Astrophysics
University of California Santa Cruz

Martin will talk about what the accretion of matter onto supermassive black holes does in the nuclei of galaxies.

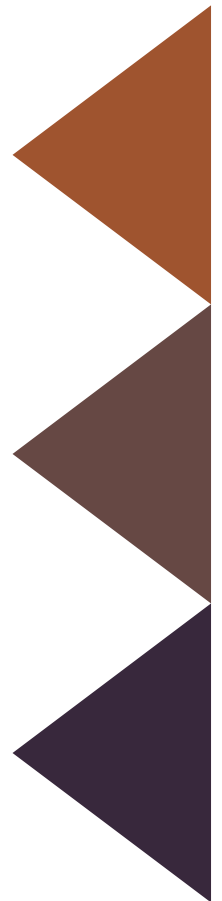
FUTURE PROGRAMS

October - Club Viewing Night
November - How to Buy a Telescope
December - Holiday Gathering for club members

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Cover: Comet NEOWISE as seen from the International Space Station. Photo Credit: NASA



CALENDAR

PAC Meeting
 Tuesday July 28, 2020, 7:30pm
 Via Zoom

PAC Meeting
 Tuesday August 25, 2020, 7:30pm

PAC Meeting
 Tuesday, September 29, 2020, 7:30pm

2020 STAR PARTY DATES

	Date	Date
January	17	24
February	14	21
March	13	20
April	17	24
May	15	22
June	12	19
July	10	17
August	14	21
September	11	18
October	9	16
November	6	13
December	11	27

Dates in **BOLD** are closest to the New Moon.

CLUB OFFICERS

President	Bob Kacvinsky kacvinskyb@yahoo.com
Vice President	Rick Brown rickbrown2000@gmail.com
2nd VP (Program Chair)	James Quach jamesq@utexas.edu
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Outreach Coordinator	Mike Kearns mkearns@neb.rr.com
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com



Shop through Amazon Smile to automatically donate to PAC:
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www.prairieastronomyclub.org

Meeting Minutes

Bill Lohrberg

PAC meeting minutes
June 30, 2020 as
recorded by Bill Lohrberg

PAC meeting via Zoom
with 25 participants,
President Bob Kacvinsky
began at approximately
7:32 pm with a welcome,
introduction of Tom Field
who will be presenting
“you can almost touch the
stars” for the program

Jim Kvasnicka presented
the observing report

- Star parties scheduled
for July 10, and July 17
Cortland site
- Nebraska Star Party
for 2020 has been
cancelled
- July night time planets:
Jupiter reaches
opposition July 14, Saturn
at opposition July 20, and
Mars increases in
brightness to -1.1,
Neptune rises an hour
before Mars, Uranus hour
after Mars
- Pre-dawn planets:
Venus shines at brightest
-4.7 through the month,
Mercury at inferior
conjunction reappears at
dawn around July 17
- Messiers – M3, 4, 5,
53, 68, 80, 83, Jim

reminds globular clusters
are classified 1 through
12 from highly
concentrated globular to
very loose and everything
in between. Jim also
notes there is a globular
cluster observing program
– observe 50 of them,
one could complete this in
a short time during the
summer months

- Other deep sky
objects: NGC 6229, 6302,
6369, 6543, IC4703/M16

Bob Kacvinsky continued
with items of interest in
the news

In late May into June –
reports are confirming
gravitational waves coming
from emerging black
holes, able to measure
using European
Gravitational Observatory,
Virgo, LIGO. Etc.

Announcements

- MSRAL was
cancelled for this year in
Oklahoma, postponed to
June of 2021 same
location
- Bob commented
that in the conference call
with MSRAL learned a lot
about how observatories

in KC and St Louis are
handling the social
distancing and struggles
with outreach etc.

Several are trying to do
virtual events and clubs
are having private star
parties with small groups
going out to do observing
as we do.

- Waiting for
decision from Parks and
Rec as to Hyde reopening
- Bob attended the
Hyde board meeting and
summary proposal for
opening Hyde is being
presented to Lincoln
Parks and Rec.
- Ron Veys added
that a notice outlining
procedures for reopening
will be sent out to all
volunteers asking input
and whether they are still
willing to volunteer or not
under the conditions of
the proposal. If enough
volunteers approve, this
will be sent on to Lincoln
Parks and Rec who will
make final decision as to
reopening.
- Bob encouraged
all to attend scheduled
club star parties, June 12
was a spectacular
evening of observing “as
close to an NSP quality
night” transparency and

Minutes...

seeing were in the high 4 or 5 rating until about 2am.

- July 28 meeting likely to be another Zoom meeting, Solar observing program may be postponed to the end of July or end of August
- Bob again thanked everyone for continued patience.

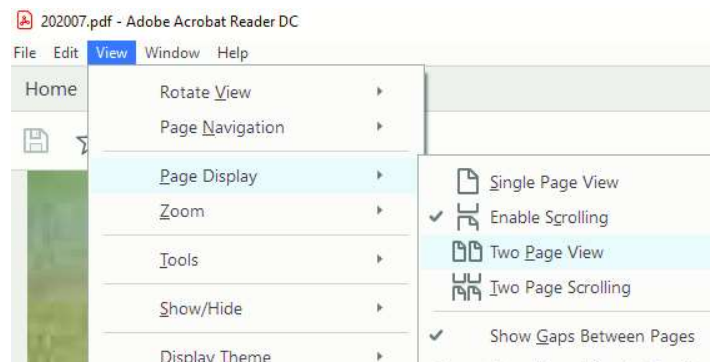
- Jack Dunn mentioned his friend Herb Schwartz in Des Moines at the Drake observatory has been hosting a weekly zoom lecture series every Friday night, these have been recorded and available on You Tube. Encourages everyone to search under Drake Observatory to find

and enjoy these.

With no further discussion, Bob introduced Tom Field to present the program "You can almost touch the Stars", explorations into astronomical spectroscopy.

New Newsletter Format

As you've no doubt noticed, I'm experimenting with a new layout for the newsletter, using more magazine-like two page spreads. The PDF is generated as regular pages in case you want to print it (does anyone still print newsletters?). To view it in the page spread format, select **View ->Page Display->Two Page View**. Acrobat will then show two pages side by side.



The President's Message

Bob Kacvinsky



July will be our 4th month of having to meet virtually. The last 3 months we have met via Zoom. I want to thank the entire membership for their patience as we all work through these unique times. I also appreciate the excellent attendance we have had at each of the 3 Zoom meetings held to date. One advantage of meeting via Zoom is we have been able to have some great speaker programs that we would otherwise not be able to coordinate. Jack Dunn has been especially helpful in lining up our last two speakers.

Last month our speaker, Tom Field, an editor from Sky and Telescope Magazine, author of the RSpec software program provided an interesting talk on equipment that amateur astronomers can use to gather spectrum of stars. My impressions were always that taking spectrographs required extensive equipment and special expertise, but Tom showed us how it can be done with a relatively inexpensive eyepiece and software. I hope you all enjoyed the presentation as much as I did. If you

decide to try out the Star Analyzer 100 filter and RSpec software let us know how it worked. I'm thinking it might be fun to try out.

We originally had the July meeting program scheduled to review photos from the participants of NSP. We have had a couple star parties and several of our members have captured photos of Neowise Comet, along with photos this coming week for those that are still planning to set up at Merritt Reservoir. We will still plan to have a "photo share" session after our brief meeting July 28th so plan to share if you can. Jack Dunn and I have also talked about an alternative speaker but have not locked it down as of this writing. I will send out an invitation to all members by July 24th with Zoom connection and meeting information. Please be on the lookout.

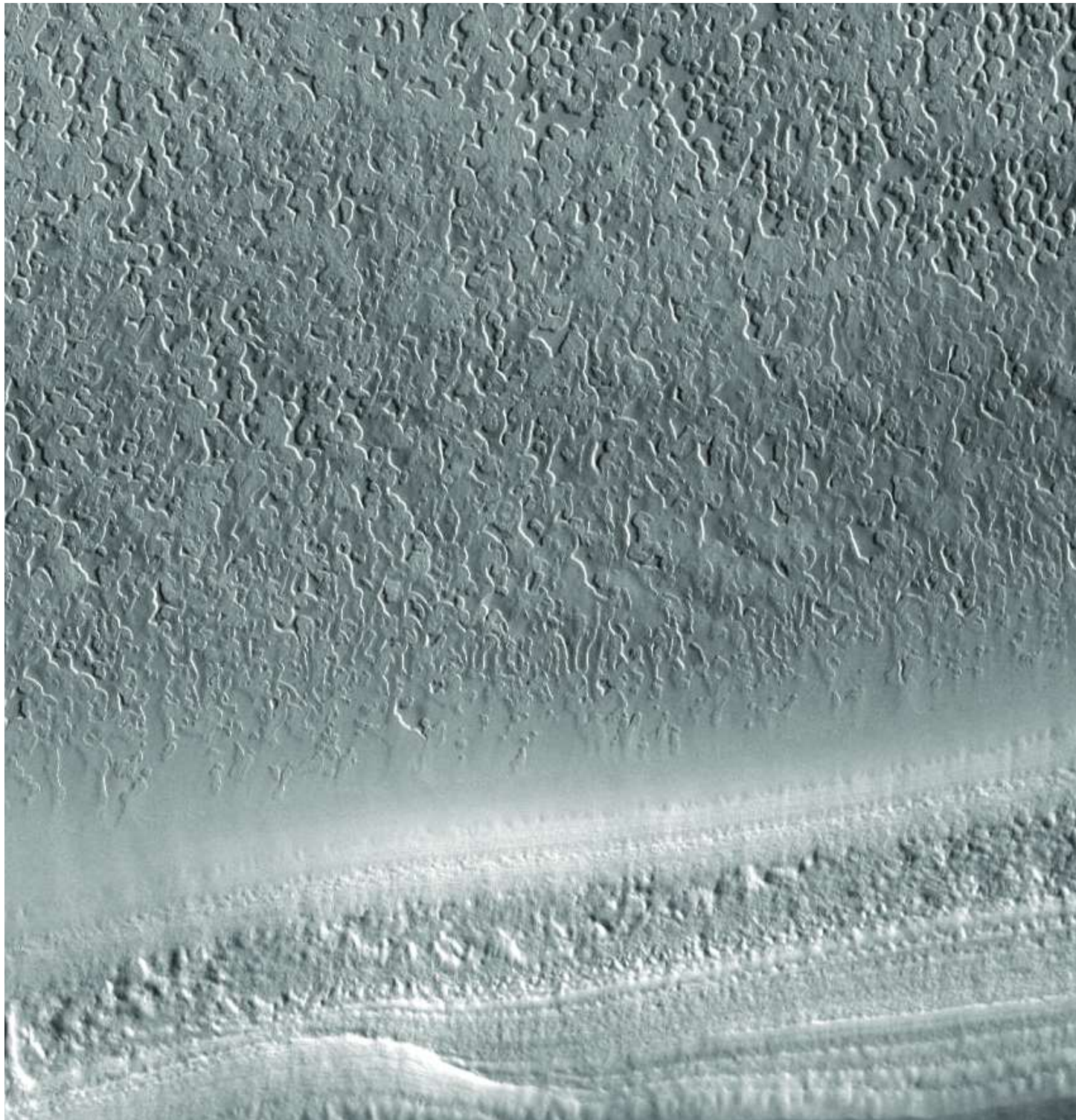
The Hyde Board has been working on a plan to reopen Hyde Observatory, and has asked volunteers for their input. There is still no approved plan to reopen. If you have been

following the news opening up activities is an ever changing dynamic. We will let the membership know of any updates when they become available.

Wishing you all well and safe during these summer months. Hope you can get out and enjoy the wonders of our beautiful Nebraska clear and dark skies. Check out comet NEOWISE in the western sky right after sunset. It should be a great view for kids of all ages.

South Polar Cap

The sun has risen over the Martian south pole in this springtime VIS image. At the bottom of the image is a trough that reveals the layered nature of the polar cap ice. Orbit Number: 81700 Latitude: -85.4398 Longitude: 309.383 Instrument: VIS Captured: 2020-05-15 11:24. Image credit: NASA/JPL-Caltech/ASU.





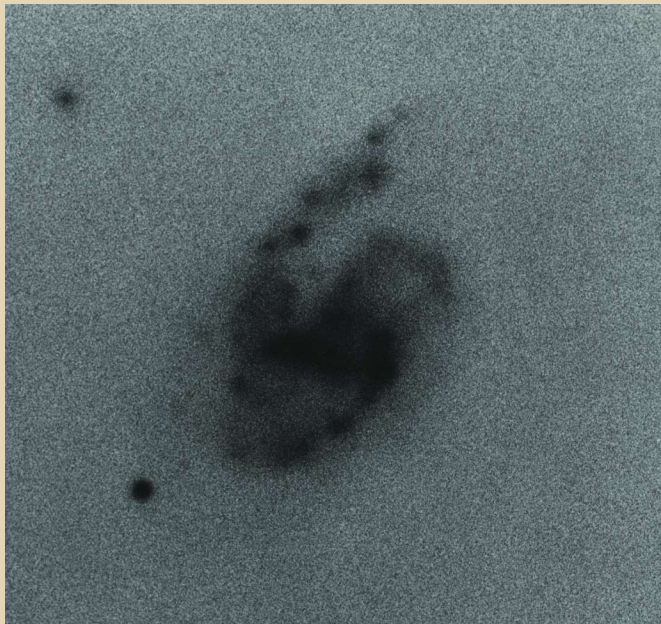
Rick Johnson

ARP 20

Arp 20/UGC 3014 is a triple-armed (by Arp's classification) spiral located about 190 million light-years from us in Taurus. NED classifies it as SB? while Seligman says SABb? I measure its size at 52,000 light-years though Seligman says 60,000 light-years. I can't stretch it that far. The third arm seems to come from the core rather than the ends of the bar. How it

remains stable is a mystery to me. I'd think it rapidly destroyed by tidal forces. Apparently not. The other arms seem distorted. Yet there's nothing around that appears to have interacted with it. Maybe all this is due to some galaxy it is currently digesting. That could explain the third arm and distortion of the other two.

ARP's Image



The Mantrap Skies Image Catalog

Rick Johnson, a founding member of the Prairie Astronomy Club, passed away in January, 2019. His legacy lives on through his comprehensive catalog of over 1600 images at www.mantrapskies.com.



August Observing

Jim Kvasnicka



This is a partial list of objects visible for the upcoming month.

Planets

Jupiter: Jupiter shines at magnitude -2.6 with a disk 44" wide.

Saturn: Shines at magnitude +0.3 with a disk 18" wide.

Mars: Rises 3 hours after sunset and increases in magnitude to -1.8.

Uranus and Neptune: Look for Uranus in Aries and Neptune in Aquarius.

Venus: Rises around 2:45 am at magnitude -4.3.

Mercury: Very low in the dawn sky to start August.

Meteor Showers

Perseids: Peaks the night of August 11-12. Expect 50-75 meteors per hour in dark skies.

Messier List

M6/M7: Open clusters in Scorpius.

M8: The Lagoon Nebula in Sagittarius.

M9/M10: Class VIII and VII globular clusters in Ophiuchus.

M12/M19: Class IX and VIII globular clusters in Ophiuchus.

M20: The Trifid Nebula in Sagittarius.

M21/M23: Open clusters in Sagittarius.

M62/M107: Class IV and X globular clusters in Ophiuchus.

Last Month: M3, M4, M5, M53, M68, M80, M83

Next Month: M13, M14, M22, M28, M54, M69, M70, M92

NGC and other Deep Sky Objects

NGC 6717: Palomar 9, Class VIII globular cluster in Sagittarius.

NGC 6741: Planetary nebula in Aquila.

NGC 6781: Planetary nebula in Aquila.

NGC 6818: Little Gem, planetary nebula in Sagittarius.

B86: The Ink Spot, dark nebula in Sagittarius.

Double Star Program List

Struve 2404: Close pair of orange stars in Aquila.

57 Aquilae: Pair of white stars.

Beta Cygni: Albireo, gold and blue stars.

31 Cygni: Yellow primary with a blue secondary.

61 Cygni: Two orange stars.

Epsilon Lyrae: The Double Double.

Zeta Lyrae: Yellow pair.

Beta Lyrae: Yellow primary with multiple white stars.

Challenge Object

NGC 6822: Barnard's Galaxy in Sagittarius.

Focus on Observing

ARP Peculiar Galaxy (Northern) Observing Program

Jim Kvasnicka

The Arp Peculiar Galaxy Observing Program is based on the 338 objects in the Arp Catalog of Peculiar Galaxies. This program was developed for advanced amateurs and it may not be suited for beginners. A majority of the 338 galaxies fall in the 12th to 18th magnitude range. However there are over 100 Arp objects below magnitude 13.5.

This is an advanced observing program for large telescopes, it is recommended that you use a telescope with an aperture of 12.5 inches or larger, and observe from dark sky sites. This observing program will challenge even the most

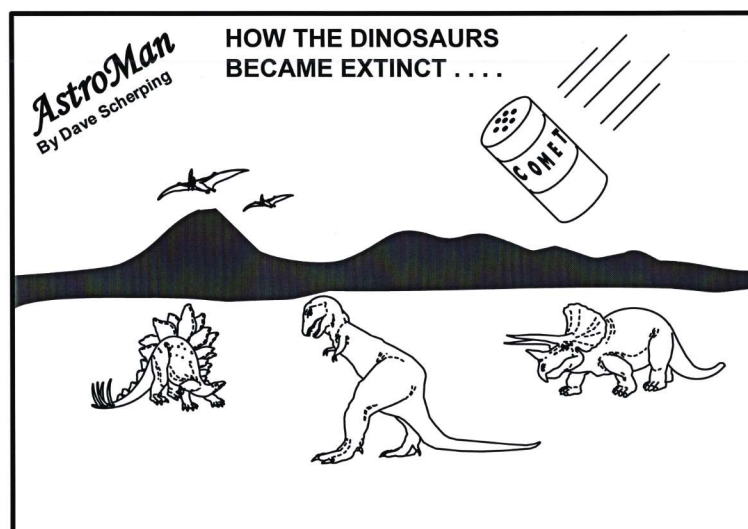
serious amateur astronomer.

To qualify for the Arp Peculiar Galaxy (Northern) Observing Program certificate and pin you must observe or image 100 of the 338 Arp galaxies. You may select any 100 objects from the list. Some of the Arp objects are multiple galaxies and only the brightest member of the group needs to be observed or imaged. For locating the Arp galaxies a good star atlas is recommended such as the "Uranometria 2000".

You can use your own observing logs to record your observations. Your

observations should include: object name, date and time, power, seeing, telescope used, latitude and longitude, and your observing notes.

Once you complete the Arp Peculiar Galaxy (Northern) Observing Program you will need to submit your observing logs to me for review. I will contact the Arp Peculiar Galaxy (Northern) Observing Program chair for approval. Once I receive your certificate and pin I will present them to you at the next PAC meeting.



Astrophotography

On July 11 we had a pretty good monsoon storm, which blew our outdoor umbrella over and gave us about a tenth of an inch of badly needed rain. But then the clouds blew off, and in the morning at 3:30 I was surprised to see that the sky was clear, for the first morning in the past several days. I grabbed my Nikon and a tripod and headed outside to try to image the comet.

As the comet rose it was definitely visible to the naked eye, although you probably wouldn't notice it if you weren't looking for it. It was gorgeous in binoculars, showing 2-3 degrees of tail.

I took a couple of dozen images at different time exposures. Some of them turned out pretty clear, and one of those is attached.

*Photo details: 50 mm lens at f/2.5
(equivalent to about an 80 mm lens on a full-frame DSLR)
ISO 800, 3 seconds*

*Larry Stepp
Tucson, Arizona*



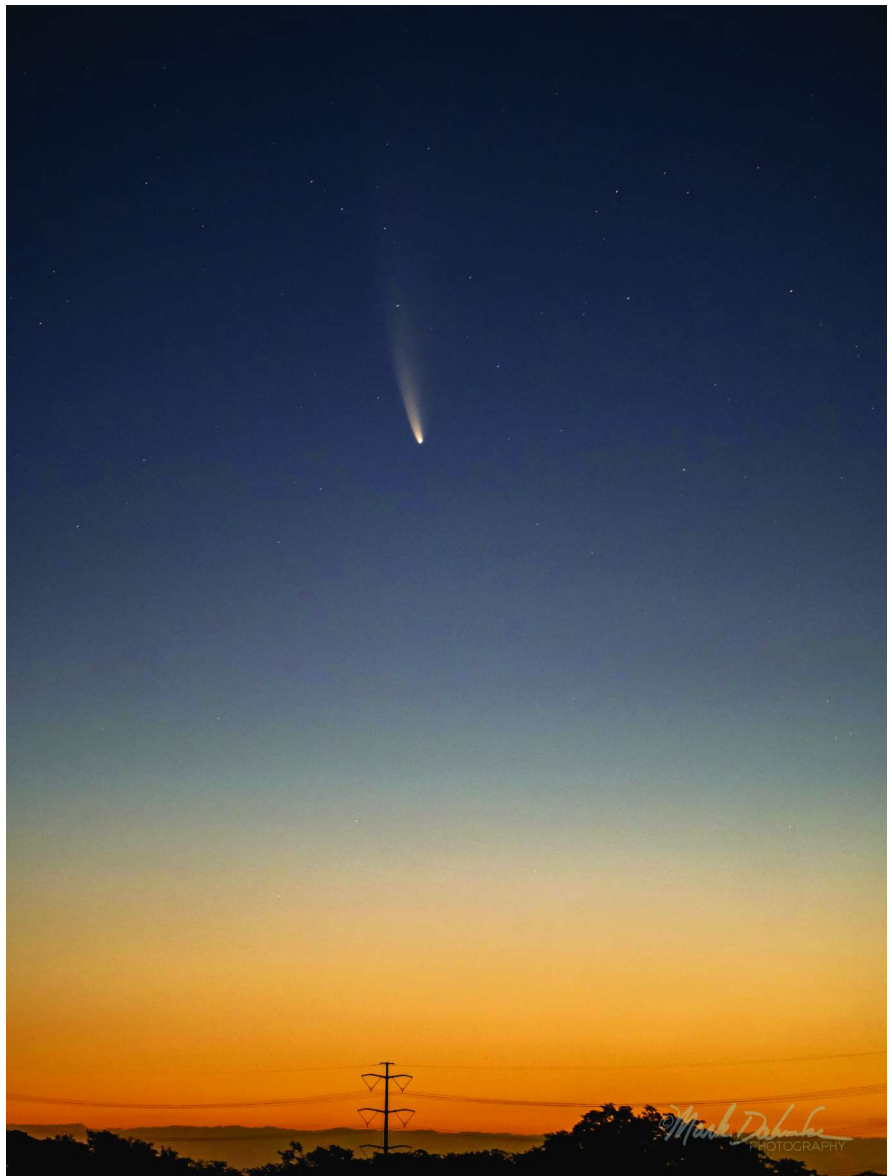
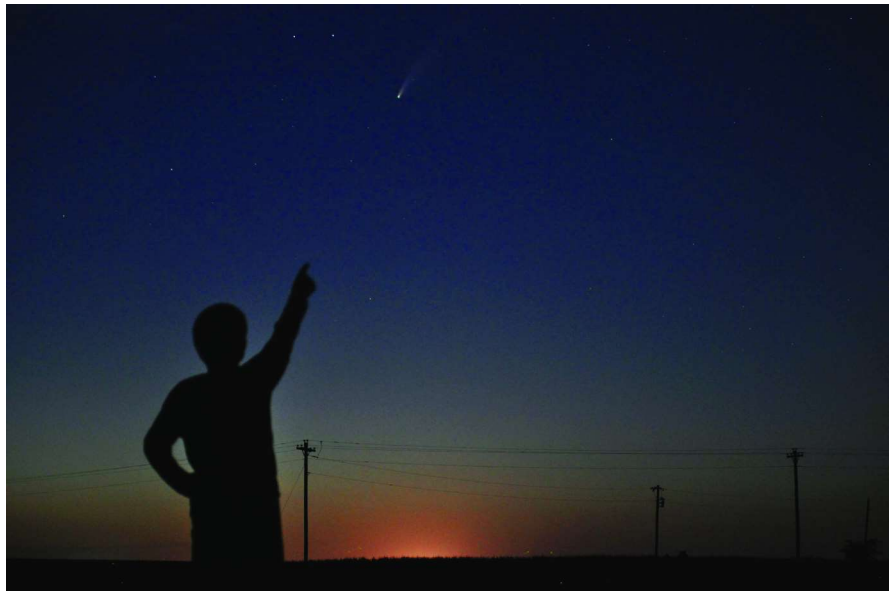


Astrophotography

*Comet NEOWISE by Brett Boller.
Canon t7i, Canon 18mm lens, f/4, ISO 1600, 6 seconds.*



*NEOWISE and Gideon
by Jenny Jo Johnson*

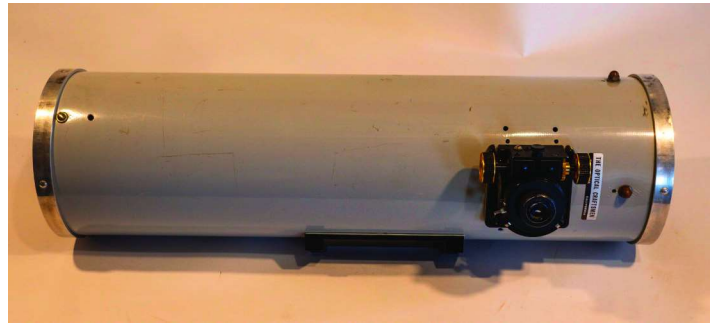


Above: NEOWISE by Mark Dahmke. Panasonic Lumix G9 ISO 1600, 150mm eff. Focal length, 5 sec, f/5, July 8 at 5am. Taken near 112th & Fletcher, Lincoln.

For Sale

The following items belonged to Rick Johnson, one of the founding members of the Prairie Astronomy Club. If you're interested in buying any of them, please contact Mark Dahmke. There are additional small items (parts, adapters) not shown.

\$100.00	Losmandy dovetail mount parts, DP-175	
\$3,500.00	Questar telescope, 1960, solar filter, two eyepieces, power cord, manual.	
\$200.00	The Optical Craftsmen 6" newtonian reflector	
\$50.00	Bushnell Sky Chief 60mm refractor, 910mm focal length, 1.25 barlow, 40mm eyepiece, 18-40 zoom?, right angle prism	
\$20.00	Aluminum dovetail mount, 10 x44 cm with scope brackets	
	Daystar filter, University, 6562.8 angstrom	
\$150.00	Tele Vue Powermate 2.5x 1.25" barlow	
\$100.00	Celestron 28mm Erfle 1.25" eyepiece	
\$30.00	University 2.8X Klee Barlow 1.25"	
	Scopetronix Maxview 40 1.25"	
\$50.00	Opt Superview 30mm wide angle 2"	
\$50.00	Opt Superview 50mm wide angle 2"	
	Edscorp K 18mm 1.25"	
	Laser collimator	
	Lumicon easy guider	
	1.25" diagonal	
	Misc 1.25 adapters	
	O-III Hydrogen-beta, Hydrogen-alpha	28mm thread
\$50.00	Lumicon UHC filter	28mm thread
\$50.00	Nebula Line transmission, O-III, Hydrogen-beta	28mm thread
\$50.00	Nebula Line transmission, O-III, Hydrogen-beta	28mm thread
\$300.00	Lumicon H-alpha pass filter for B&W photography, 2"	72mm thread
\$70.00	Lumicon H-alpha pass filter for B&W photography,	47mm thread
\$100.00	Minus violet filter Lumicon	72mm thread
\$80.00	Minus violet filter Lumicon	58mm thread
	Hoya red filter	52mm thread
	Lumicon Premium filter 496nm, 486, 501, 656	48mm thread
	Bushnell binoculars "Custom"	
	Ensign 7x35 binoculars	
	Bauch and Lomb binoculars	



Above: Rick Johnson's telescopes and accessories.

Right: a 10" homemade Dobsonian that belonged to Don Taylor. Please contact Mary Taylor at taylorshy07@yahoo.com if you're interested in this telescope and accessories.



Black Hole Collision May Have Exploded With Light

In a first, astronomers may have seen light from the merger of two black holes, providing opportunities to learn about these mysterious dark objects.

When two black holes spiral around each other and ultimately collide, they send out gravitational waves - ripples in space and time that can be detected with extremely sensitive instruments on Earth. Since black holes and black hole mergers are completely dark, these events are invisible to telescopes and other light-detecting instruments used by astronomers. However, theorists have come up with ideas about how a black hole merger could produce a light signal by causing nearby material to radiate.

Now, scientists using Caltech's Zwicky Transient Facility (ZTF) located at Palomar Observatory near San Diego may have spotted what could be just such a scenario. If confirmed, it would be the first known light flare from a

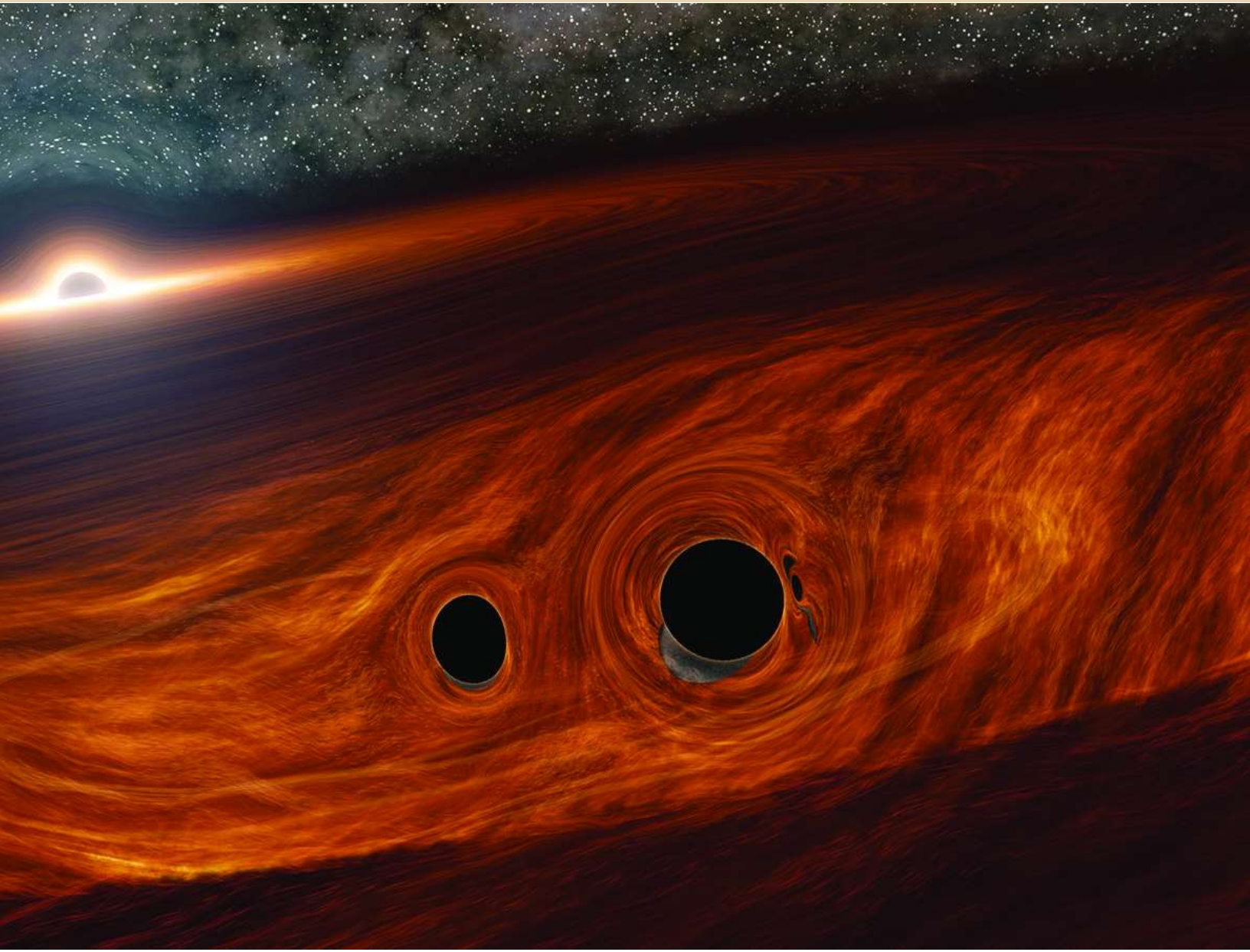
pair of colliding black holes.

The merger was identified on May 21, 2019, by two gravitational wave detectors - the National Science Foundation's Laser Interferometer Gravitational-wave Observatory (LIGO) and the European Virgo detector - in an event called GW190521g. That detection allowed the ZTF scientists to look for light signals from the location where the gravitational wave signal originated. These gravitational wave detectors have also spotted mergers between dense cosmic objects called neutron stars, and astronomers have identified light emissions from those collisions.

The ZTF results are described in a new study published in the journal

Physical Review Letters. The authors hypothesize that the two partner black holes, each several dozen times more massive than the Sun, were orbiting a third, supermassive black hole that is millions of times the mass of the Sun and surrounded by a disk of gas and other material. When the two smaller black holes merged, they formed a new, larger black hole





This artist's concept shows a supermassive black hole surrounded by a disk of gas. Embedded in this disk are two smaller black holes that may have merged together to form a new black hole. Image credit: Caltech/R. Hurt (IPAC)

that would have experienced a kick and shot off in a random direction. According to the new study, it may have plowed through the disk of gas, causing it to light up.

"This detection is extremely exciting," said Daniel Stern, coauthor of the new study and an astrophysicist at NASA's Jet Propulsion Laboratory

in Southern California, which is a division of Caltech. "There's a lot we can learn about these two merging black holes and the environment they were in based on this signal that they sort of inadvertently created. So the detection by ZTF, coupled with what we can learn from the gravitational waves, opens up a new avenue

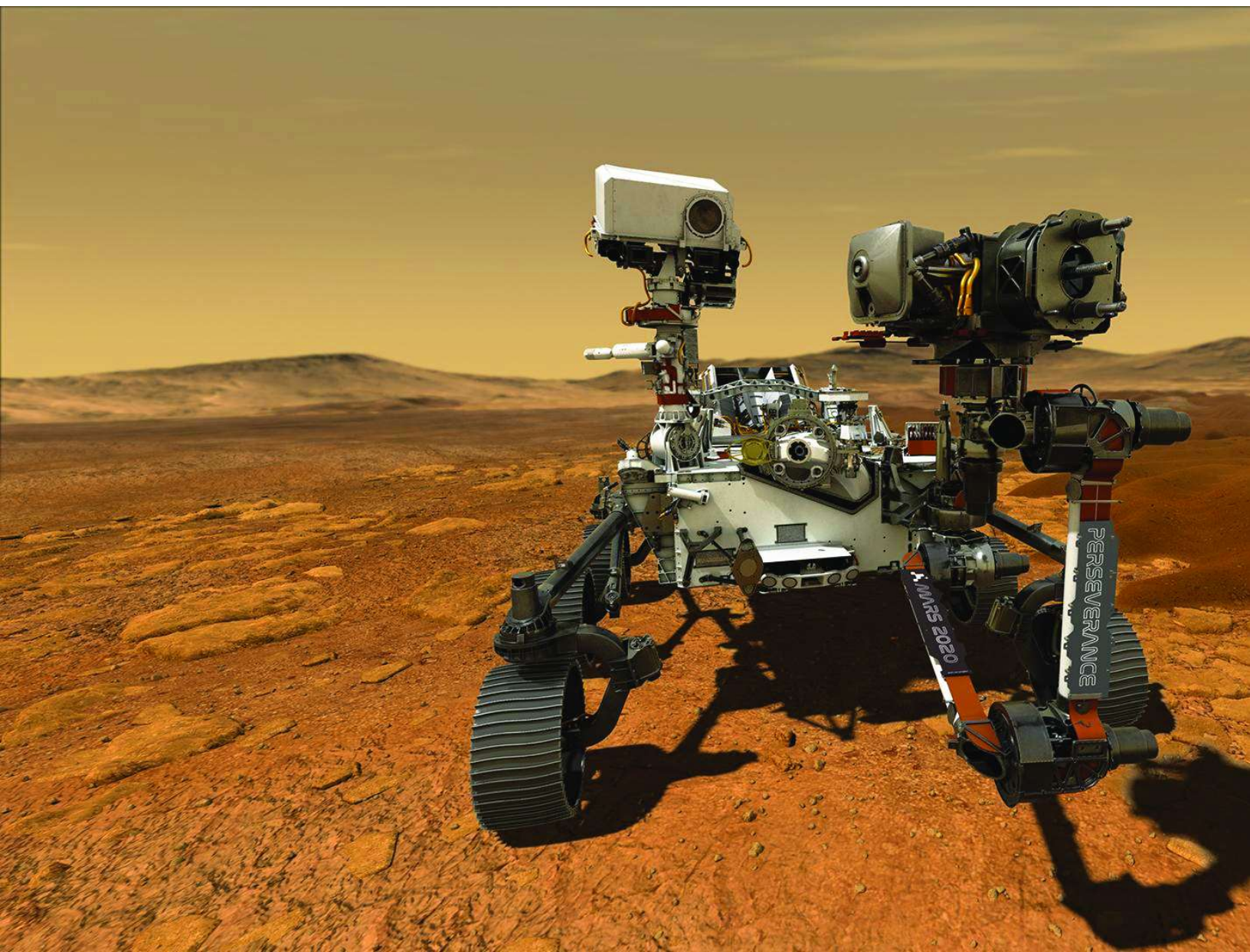
to study both black hole mergers and these disks around supermassive black holes."

The authors note that while they conclude the flare detected by ZTF is likely the result of a black hole merger, they cannot completely rule out other possibilities.

[Learn more...](#)

7 Things to Know About the Mars 2020 Perseverance Rover Mission

NASA's next rover to the Red Planet is slated to launch no earlier than July 30. These highlights will get you up to speed on the ambitious mission.



In less than a month, NASA expects to launch the Mars 2020 Perseverance mission from Cape Canaveral, Florida. Loaded with scientific instruments, advanced computational capabilities for landing, and other new systems, the Perseverance rover is the largest, heaviest, most sophisticated vehicle NASA has ever sent to the Red Planet.

"Perseverance sets a new bar for our

ambitions at Mars," said Lori Glaze, planetary science director at NASA Headquarters in Washington. "We will get closer than ever before to answering some of science's longest-standing questions about the Red Planet, including whether life ever arose there."

What drives Perseverance's mission and what will it do at the Red Planet? Here are seven things to know:

1. The Perseverance rover draws on the NASA - and scientific - spirit of overcoming challenges.

The rover has a tough mission. Not only does it have to land on a treacherous planet, it has to work on its science goals: searching for signs of ancient microbial life, characterizing the planet's geology and climate, collecting carefully selected rock and sediment samples for future return to Earth, and paving the way for human exploration beyond the Moon.

These activities epitomize why NASA

chose the name Perseverance from among the 28,000 essays submitted during the "Name the Rover" contest. Because of the coronavirus pandemic, the months leading up to the launch in particular have required creative problem solving, teamwork, and determination.

"Building this incredibly sophisticated rover has been the hardest thing I've ever been a part of as an engineer," said Ray Baker, the mission's flight system manager at NASA's Jet Propulsion Laboratory in Southern California. "While coronavirus added significant challenges and logistics, the team has shown great determination and diligence to build a rover we can be proud to send to Mars. We can't wait to see the many years of dedication pay off at the launch pad."

2. Perseverance builds on the lessons of other Mars rovers.

NASA's modest first rover - Sojourner - demonstrated in 1997 that a robot could rove on the Red Planet. Spirit

This illustration depicts NASA's Perseverance rover operating on the surface of Mars. Perseverance will land at the Red Planet's Jezero Crater a little after 3:40 p.m. EST (12:40 p.m. PST) on Feb. 18, 2021. For more information about the mission, go to <https://mars.nasa.gov/mars2020/>. Image Credit: NASA/JPL-Caltech



7 Things to Know...

and Opportunity, which landed in 2004, found evidence that the planet once hosted running water before becoming a frozen desert. Curiosity, which has been exploring Mars since 2012, discovered that its landing site, Gale Crater, was home to of a lake billions of years ago, with an environment that could have supported microbial life.

Perseverance aims to take the next step, seeking, as a primary goal, to answer one of the key questions of astrobiology: Are there any signs that life once existed on Mars?

3. The rover will be landing in a place with high potential for finding signs of past microbial life.

Jezero Crater is 28 miles (45 kilometers) wide and sits on the western edge of Isidis Planitia, a giant basin just north of the Martian equator dug out long ago when a space rock hit the surface. Sometime between 3 billion and 4 billion years ago at Jezero, a river flowed into a body of water the size of Lake Tahoe.

"The science team has

had many discussions internally and externally about where the next Mars rover should go," said Ken Farley, the mission's project scientist, based at Caltech in Pasadena. "We ultimately chose Jezero Crater because it is such a promising location for finding organic molecules and other potential signs of microbial life."

4. Perseverance will also be collecting important data about Mars' geology and climate.

Mars orbiters have been collecting images and other data from Jezero Crater from about 200 miles (322 kilometers) above, but finding signs of ancient life on the surface will require much closer inspection. It demands a rover like Perseverance, which can look for signs that may be related to life and can analyze the context in which they were found to see if they were biological in origin.

Understanding Mars' past climate conditions and reading the geological history embedded in its rocks will also give us a sense of why Earth and Mars - which formed from the same primordial stuff - ended up so different.

5. Perseverance is the first leg of a round trip to Mars.

Verifying ancient microscopic life on Mars carries an enormous burden of proof. Perseverance is the first rover to bring a sample-gathering system to Mars that will package promising examples of rocks and sediments for return to Earth by a future mission.

A Mars Sample Return campaign is being planned by NASA and the European Space Agency because here on Earth we can investigate the samples with instruments too large and complex to send to Mars. Terrestrial laboratories would be used to establish whether any potential signs of life detected by the rover are definitive evidence of past life.

6. Perseverance carries instruments and technology that will pave the way for human missions to the Moon and Mars.

The Terrain-Relative Navigation system, which autonomously helps the rover avoid hazards during landing, and the Mars Science Laboratory Entry, Descent, and

***You can follow Perseverance's adventure on social media
@NASAPersevere and @NASAMars.***

Landing Instrumentation 2 (MEDLI2) sensor suite, which gathers crucial data during the journey through the Martian atmosphere, will help future human missions land more safely and with larger payloads on other worlds.

Perseverance also has features that will help astronauts once they're on the surface of another world: improved self-driving smarts for more efficient travel and the Mars Environmental Dynamics Analyzer (MEDA) instrument suite, which will provide key information about weather, climate, and

dust. Meanwhile, the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) technology demonstration aims to produce oxygen from Mars' carbon dioxide atmosphere, demonstrating a way future explorers might produce oxygen for rocket propellant as well as for breathing.

7. You will get to ride along.

The Perseverance rover and other parts of the Mars 2020 spacecraft feature 23 cameras - more cameras than any interplanetary mission in history. They'll help

engineers put together a high-definition view of the landing process after the rover safely touches down on Mars on Feb. 18, 2021, and they'll deliver images of the landscape and scientific specimens in breathtaking detail. And as with previous Mars missions, this one plans to make raw and processed images available on the mission's website.

Perseverance also carries three silicon chips with the names of nearly 11 million people who signed up to ride with the mission.

***For more on the mission, visit:
<https://mars.nasa.gov/perseverance/>***

***For more about NASA's Moon to Mars plans, visit:
<https://www.nasa.gov/topics/moon-to-mars>***

From the Archives

July, 1990

President's Message

by Ron Debus

Our observing site now has an out-house. Club member Dave Kipel built the house, hauled it to the site, and with the help of Steve Bornemeier, Earl Moser, my nephew from Michigan Jeff Newman, and myself, set the house on the shaft north of the pad. Special thanks goes to Dave for taking the time to do a tremendous job!

I've also put more 'keep out' signs around the pad and on the buildings. The next step is to get our families to the site, and then eventually name it. We have discussed the idea of naming the site more than once, but the idea was laid to rest both times. Perhaps we should again consider it. I have one or two names in mind, and I know others have been suggested. Eventually I feel we will have a very nice park at the site.

On August 18th we will have the annual club picnic and star party. The picnic will be at Hyde Observatory and then we will caravan down to the site, as we have done in the past. The picnic is pot-luck and be sure to bring your own plates and silverware (and your families!). At last years picnic we had only 17 people, so this year we need a better turn out! If the sky is clear and we don't have a moon we might end our outing with the Persied and Cygnus meteor shower.

Twice now, when I've scanned the sky with binoculars at the party, fire-balls have broken the field of view, so that you could actually see the flames. I can't help but think this is not such a rare event. Has anyone else seen fireballs when binocular viewing? I'd like to hear from you. It's something I know I won't soon forget.

I hope to see all of you at the next meeting. Let's have a good turn out! Thanks for listening.

CLUB MEMBERSHIP INFO

REGULAR MEMBER - \$30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - \$35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - \$10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

CLUB TELESCOPES

To check out one of the club telescopes, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: Available
 10 inch Meade Starfinder Dobsonian: Available
 13 inch Truss Dobsonian: Needs repair
 10 inch Zhumell: Needs mount

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy. Order online from Amazon or lulu.com.

ADDRESS

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The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular \$30/yr, Family \$35/yr.** Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585.** For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505** or mark@dahmke.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

