Vol. 52, no. 10

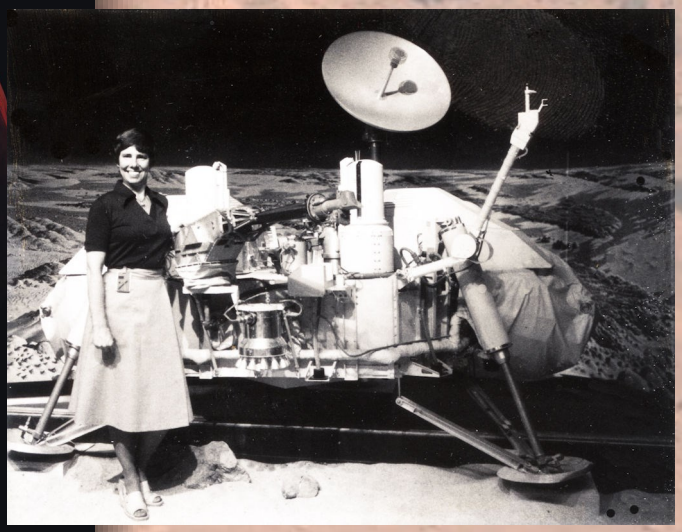
The W.A.S.P.

October 2020

The Warren Astronomical Society Paper

Virtual Meeting October 15, 2020

Is There Life on Mars?



Special Guest Speaker

Dr. Patricia Ann Straat

Be sure to tune in to our virtual meeting in Webex & streamed on YouTube

The WASP

Published by
Warren Astronomical Society, Inc.
P.O. Box 1505
Warren, Michigan 48090-1505

Dale Thieme, Editor

2020 Officers

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The Warren Astronomical Society, Inc., is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first Monday and third Thursday of each month, starting at 7:30 p.m.

First Monday meeting:
Cranbrook: Institute of Science
1221 North Woodward Ave
Bloomfield Hills, Michigan

Third Thursday meeting:
Macomb Community College
South campus, Bldg. J, Room J221
14600 Twelve Mile Rd.
Warren, Michigan

Membership and Annual Dues

Student	Individual	Senior Citizen	for families
$17.00	$30.00	$22.00	add $7.00

Astronomical League (optional)$7.50
Send membership applications and dues to the treasurer:
c/o Warren Astronomical Society, Inc.
P.O. Box 1505
Warren, Michigan 48090-1505

Pay at the meetings

Also via PayPal (send funds to treasurer@warrenastro.org

Among the many benefits of membership are
Loaner telescopes (with deposit). See 2nd VP.
Free copy of each WASP newsletter.
Free use of Stargate Observatory.
Special interest subgroups. See chairpersons.

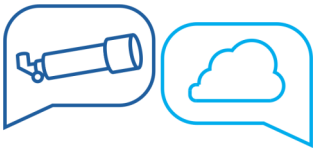
The Warren Astronomical Society Paper (WASP) is the official monthly publication of the Society.
Articles for inclusion in the WASP are strongly encouraged and should be submitted to the editor on or before the end of each month. Any format of submission is accepted. Materials can either be transmitted in person, via US Mail, or by email (publications@warrenastro.org)

Disclaimer: The articles presented herein represent the opinion of their authors and are not necessarily the opinion of the Warren Astronomical Society or this editor. The WASP reserves the right to edit or deny publication of any submission.

Stargate Observatory is owned and operated by the Society. Located on the grounds of Camp Rotary on 29 Mile Road, 1.8 miles east of Romeo Plank Road, Stargate features an 8-inch refractor telescope under a steel dome. The observatory is open according to the open house schedule published by the 2nd VP.

Snack Volunteer Schedule

The Snack Volunteer program is suspended for the duration. When it resumes, volunteers already on the list will be notified by email.



Discussion Group Meeting

Come on over, and talk astronomy, space news, and whatnot!

CANCELLED UNTIL FURTHER NOTICE

In This Issue:

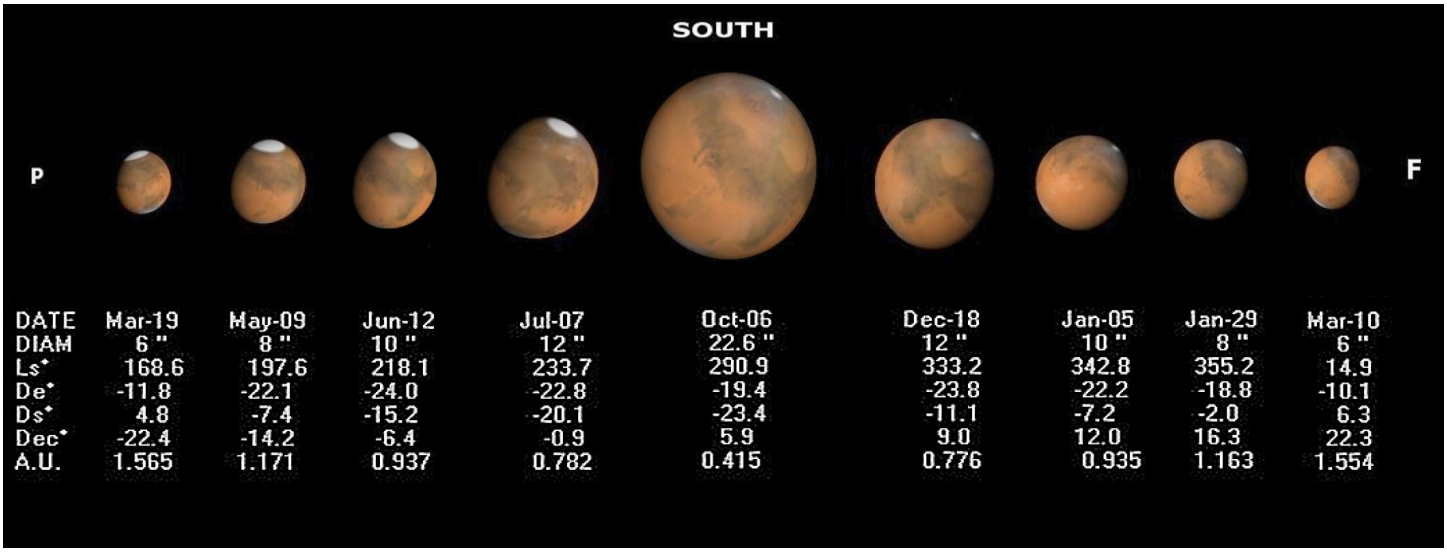
President's Field of View

Our Publications Director requested this issue of the WASP be devoted to Mars, in honor of its opposition. An opposition of Mars is a good time to reflect on bad science and wishful thinking, and Mars itself has inspired humanity to poetic and artistic endeavors from the time of Homer to the present, from its conception as the very God of War to the Twitter feeds of NASA's probes and rovers. I hope you enjoy this special issue of the WASP.

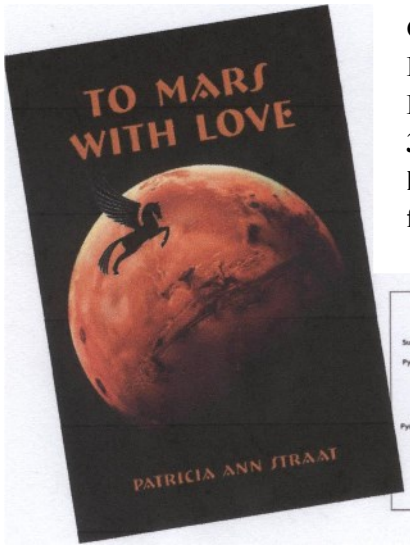
Diane Hall
President

Launch of the Perseverance Mars Rover

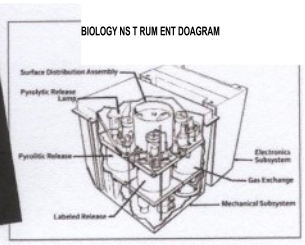
Viewing Mars, what we can expect. Courtesy of the Association of Lunar & Planetary Observers.



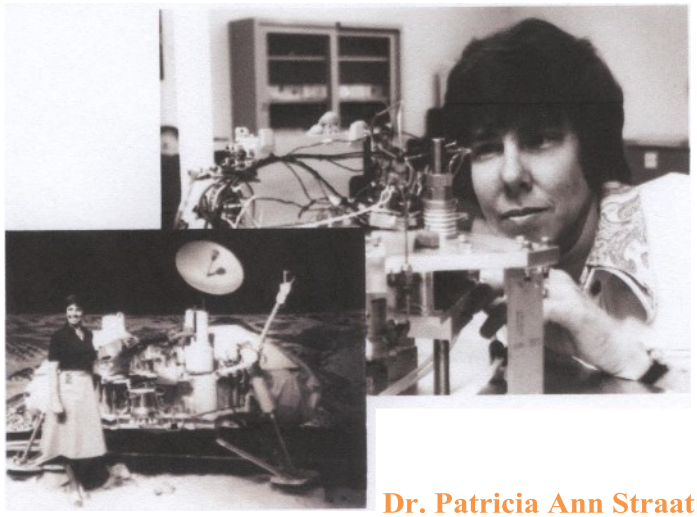
2020 Oct 06	Ls 291.0° De -19.1° Ds -23.0° RA 01:32 Dec 6.0° A.Dia 22.6″	**Mars at Closest Approach.** Bright SPC projection Novissima Thyle (300°W - 330°W) Areographic longitude. Dark rift Rima Augusta connected from 60° to 270° longitude. Rima Australis visible in SPC (290°-350°W)? W-clouds possible. SPC bright projection Argenteus Mons (10°W -20°W). SPC Dust clouds in Serpentis-Hellespontus, in Noachis? (SPC width ~10° ±2°).
2020 Oct 13	Ls 295.2° De -20.0° Ds -22.3° RA 01:23 Dec 5.5° A.Dia 22.4″	**Mars at Opposition .** Bright SPC projection Novissima Thyle (300°W - 330°W) Areographic longitude. Dark rift Rima Augusta connected from 60° to 270° longitude. Rima Australis visible in SPC (290°-350°W)? W-clouds possible. SPC bright projection Argenteus Mons (10°W -20°W). SPC Dust clouds in Serpentis-Hellespontus, in Noachis? (SPC width ~10° ±2°).



Genre: Nonfiction
Price: $29.99
ISBN, 978-164111-150-8
304 pages, full color, hardcover, 91 photos and figures



"To Mars With Love offers a wonderful, behind-the-scenes, unique, well-written account of the Viking program, and of the men and women who dared to he hold and meld scientific inquiry and technology to look for life on Mars. This book is a treasure, a fascinating read from an investigator on the front lines of discovery."
Leonard David, Space Insider Columnist, Space.com

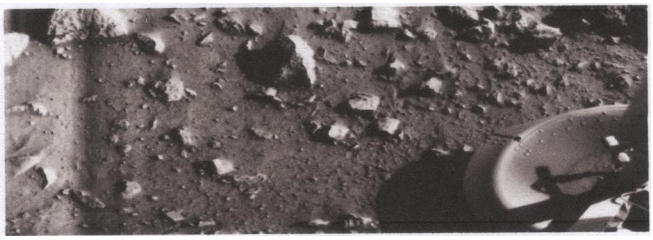


Dr. Patricia Ann Straat earned her undergraduate degree from Oberlin College and her PhD in biochemistry from Johns Hopkins University. Dr. Straat was Co-Experimenter of the Labeled Release life detection experiment and member of the Biology Flight Team during the 1976 Viking Mission to Mars.

NEW RELEASE:

The first-ever venture to detect life on Mars-1976 Viking Mission

To Mars with Love, by author Patricia Ann Straat, is the true account of a young woman's journey into space exploration sciences as Co-Experimenter of the Viking Labeled Release experiment (LR), one of three life detection experiments that landed on Mars in 1976. The controversial LR results, positive for microbial life on Mars, have been published many times and are carefully explained in layman terms, but the story of the development of the LR flight instrument with all its challenges, trials, and tribulations has never before been told.



This book encapsulates the six years prior to Viking landing, in its tense and humorous moments, bringing to life both the atmosphere and people involved in the mission. The book includes photos of Viking scientists, Viking memorabilia, and the author's behind-the-scenes compelling reflections, as she takes us back in time to the unprecedented Viking years.

The author's Viking story is intertwined with her parallel life experiences in the beachside communities of Los Angeles, and with the equestrian world of Maryland and California. The interaction of these unique and often humorous tales with the LR story provides a fascinating light-hearted contrast to the intense ongoing activities of Viking.

Review in Astrobiology Magazine: https://www.liebertpub.com/doi/pdf/10.1089/ast.2019.0122

To purchase go to https://www.tomarswithlove.com

Kalamazoo Astronomical Society

Looking Up Since 1936

September 18, 2020

Invitation to Attend 2020/2021 Season of "Online Viewing Sessions"

Dear Members of the Warren Astronomical Society:

Sharing the night sky with the public through outdoor observing has been a long-standing tradition for both of our organizations. However, persistent cloud cover and frigid temperatures make sharing the sky quite challenging during the winter months. The KAS is pleased to announce that beginning on November 7th we will be introducing "Online Viewing Sessions" that will run through February of 2021. The monthly sessions will be held on the video conferencing service Zoom. We would like to extend an invitation to all of your members to join us during one or more of the sessions. Those interested in attending should contact us through our website for the Zoom meeting ID and password. We would also be happy to add them to a mailing list, so we can send them the Zoom info before each session. Please see the table below for start times. Admission is free.

If weather conditions necessitate a cancellation there will be a second "cloud date" scheduled the following Saturday. Postponement or cancellation information will be posted on the KAS website and social media platforms.

Online Viewing Sessions utilize our premiere facility, the KAS Remote Telescope, located under the dark desert skies of Arizona Sky Village in Portal, AZ. The Remote Telescope consists of a 4-inch Takahashi refracting telescope mounted on a 20-inch PlaneWave CDK telescope, both equipped with identical full-frame CCD cameras. Session participants will view images of deep-sky objects captured on the CCD cameras in Arizona, transmitted to participant's computer, tablet, and smart phone screens. Once the session has concluded, attendees will be provided with a link to download the images captured that night to share with friends and keep as mementos. Participants will also be able to view live streaming video of the telescope in operation through our website.

The Remote Telescope Project involved a 7-year fund raising effort that included contributions from KAS members, corporations and foundations, raising over $122,000.

Primary Date	Cloud Date	Time (EST)
November 7th	November 14th	8:30 - 10:30 pm
December 5th	December 12th	8:30 - 10:30 pm
January 9th	January 16th	9:00 - 11:00 pm
February 6th	February 13th	9:00 - 11:00 pm

Dates and times for the 2020/2021 season are as follows:

For more details and to view images of the Remote Telescope, please our website at kasonline.org. You can also follow the KAS on Twitter and Facebook.

McMath-Hulbert Observatory

Here's what happened at the McMath-Hulbert Astronomical Society in September. Our monthly open house on the 5th was held and we had ten visitors. Word is definitely getting out about MHO. We participated in the Great Lakes Association of Astronomy Clubs "Astronomy at the Beach" virtual event on September 25-26. We gave a live demonstration of our horn antenna that detects the 21 cm wavelength radio emissions from neutral hydrogen atoms in the Milky Way.

Jim Shedlowsky showing off our Maksutov to the GM Astronomy Club

In addition to the original solar observation instruments, we have a 12" f/15 Maksutov telescope mounted at the top of the second tower. Marty Kunz is working to get this scope back into operation in time for the Mars opposition later this fall. This telescope is a custom design built by Dr. Max Bray, a well known Maksutov expert.

The sun is still in a very inactive state as we're between solar cycles, but we're anticipating a lot of great solar viewing over the next few years.

Our open houses are on hold for the time being, but we can accommodate individuals and small groups. Please email us at info@mcmathhulbert.org and we can schedule you in for a visit.

Regards,
Tom Hagen
MHAS

Letters

Another Hate Letter to the W.A.S.P.

And another splendid issue of the "house organ".

For a lesser man, what would spoil enjoyment of the best astro-newsletter in the "near solar neighbourhood"? Answer: an inane picture at conclusion of the president's space in the current number. *We see* a man whose initials are J. K. posing with an inflated sex toy, green amphibian looking thing with black almond eyes. My charitable self might conclude it was a specimen taken on an estuarian field study, but no. This monstrosity is a *cliché* representation of a being from Outer Space. In a recent *hommage* to Stephen Hawking at Cranbrook, a man whose initials are K. B. made the same indiscretion, and only the memory of Professor Hawking kept me from rising to object - loudly.

Want to show life on alien planets? Forget scienti-fiction, of which we have experienced *far too much.* Like green things? Show a *Closterium*. When my first specimen went through my microscope field forty years ago, the professor across the lab table, said, "And the Face of God moved upon the waters". Want a nightmarish exemplar? Harpacticoids. Calanoids. Michael Rennie they are not. To go for high probability, why stop at green, when blue-green is more on point?: cyanophytes, undifferentiated D.N.A. They can come back after *any* adversity. The "blue-greens also have the happy capacity to produce oxygen.

Savant MacDonald will speak at "Cranbrook" this month on atmospheres of distant worlds. The discovery of oxygen on such a planet would be a thunder-clap in exobiology. But I hope he additionally addresses that most wonderful molecule, chlorophyll! Might it ever be possible by remote sensing (very) to get I.R. signatures of chlorophyll A and B? I would dance the *hora*.

Leave aside what scienti-fiction authors, or infinitely worse, "alien abduction" specialists write about life Out There. *Earth is* [not] *Room Enough* (oops!), granted.

G. M. ROSS,
Last Angry Man, and
Vaquero of Primitive Telescopes.

Virtual Astronomy at the Beach 2020

After the Dust Settled

By Jeff Kopmanis
University Lowbrow Astronomers

The Setup

David Levy

As many of you know, the Great Lakes Association of Astronomy Clubs (GLAAC) annual **Astronomy at the Beach** (AATB) event became an online event in June due to the ongoing Covid-19 pandemic. Many options were considered for an in-person or even a hybrid event, but they all pointed to severe problems maintaining the safety of the astronomers, presenters and the public. The GLAAC board went into overdrive assembling a lineup of remote live viewing events when the Webmaster, Bob Trembley of the Vatican Observatory Foundation and member of the Warren Astronomical Society (WAS) managed to secure commitments to present from **David Levy, Br. Guy Consolmagno, Dan Davis, and Delores Hill**. With these national and international headliners, the GLAAC member clubs jumped to the cause and began to fill in the schedule with a wide variety of demos, presentations and talks so that by the August meeting, we had an event of **44 events**! Brian Ottum, the GLAAC Communications & PR officer, went into overdrive to get the word out. The online events were presented with Zoom and live streamed to YouTube which the general public could link to from the GLAAC AATB 2020 web site. Whew! To say the least, the Board members were confident yet plenty anxious about how it would all turn out, as this was a big event to pull off online.

Adrian Bradley introducing Delores Hill

Off To The Races…

Everyone braced as the first events at 3pm on Friday kicked off: **Awni Hafedh** (Lowbrows) put on an H-alpha solar live demo and **Paul Goelz** (WAS) demoed white-light solar. Each event had a Host to get the final Zoom configurations set, turned on the Live Stream transmission and then waited for the start time to start the YouTube live stream event. The first few events went very smoothly, just like clockwork. We'd setup a Facebook Messenger "AATB Ops" chat channel that proved to be instrumental in communicating "behind the scenes" when problems arose. It quickly became evident that we'd scheduled things pretty tight, so while there was some sweating and urgency in the 7:30-9:30 slots, the issues were worked out and by 9:30pm everything was back on schedule. The chat channel was indispensable.

Br. Guy Consolmagno in "Turn Left at Orion"

Saturday afternoon at 1pm, we had a "problems and fixes" meeting to learn of the issues that came up, and devised solutions that addressed the problems. Saturday's events ticked by one after the other virtually without incident and almost completely on-time. Unfortunately, due to our old adversary, Mother Nature, who brought with her clouds and wildfire smoke, the live events were largely converted to demos and on-the-fly talks. By midnight, the Board members all sat back in their chairs (and probably cracked open a beer) and smiled at what they'd accomplished.

(Continued on page 8)

Early Readings

Jeff Kopmanis, the GLAAC Secretary, spent Sunday pouring through the YouTube Analytics collecting usage numbers and statistics for each of the GLAAC -created YouTube events, and what was publicly available from the events that used their own resources (the Ford club, and 3 of the member sessions). All told, there were some **3939 views** and some **664 hours of view time** of our YouTube event videos for those 2 days. Most events had an **Average Duration** of about **15 minutes**, which sounds weirdly low until you consider that we had events lasting as little as 25 minutes to others that were over 3.5 hours. In our YouTube Live Chat sessions we had **1035 messages** (during the live setting) and **42 comments** left and we gained **43 subscribers** to the video channels.

The top 10 sessions were as follows (# of views in parentheses):

1. Brian Ottum (Lowbrows) - Live from NM - Fri (305)
2. Doug Bock (Lowbrows, WAS) - Live from Hartland, MI - Fri - (303)
3. Awni Hafedh (Lowbrows) - H-alpha Solar - Fri (251)
4. Br. Guy & Dan Davis - Turn Left at Orion - Sat (242)
5. Samir Hariri (Farmington) - View the Moon - Fri (238)
6. Don Swetzig (Lowbrows) - EAA from Pinckney - Fri (163)
7. Paul Goelz (WAS) - Visual Light Solar - Sat (161)
8. Awni Hafedh (Lowbrows) - H-alpha Solar - Sat (143)
9. David Levy (WAS) - Poetry of the Night - Fri (133)
10. Diane Hall (WAS) - Binocular Astronomy - Fri (131)

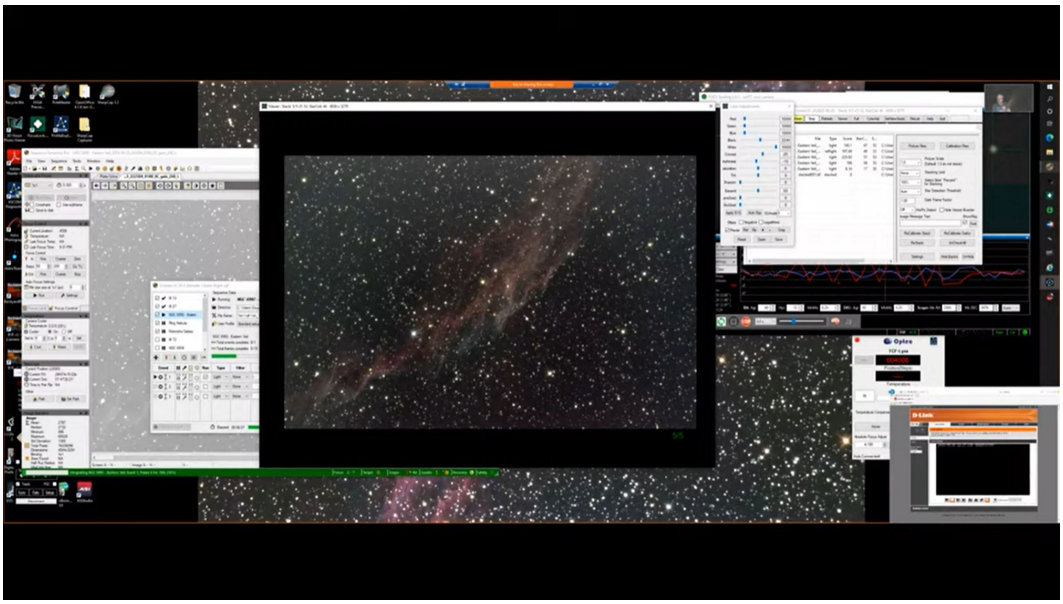
Clearly, Live events are a serious draw!

Positive comments, congratulations and Thank Yous rolled in all day on Sunday from club members, friends, family and the general public. Between our statistics and the plethora of glowing comments, it's safe to say that AATB 2020 was solidly in the "Success" column!

Conclusions

AATB 2020 Online was a success. It was plainly evident that the Board and volunteers worked together as a **team** and that it was absolutely critical when things weren't going smoothly. It would have been a disaster otherwise. There were a number of administrative and organizational lessons that became clear and were documented for the upcoming "Debrief" meeting on October 8. It also became clear that some kind of online component will be present in AATB 2021, even if in-person is possible. If you didn't get a chance to see the events, they will remain online at:

https://glaac.org/astronomy-at-the-beach-2020

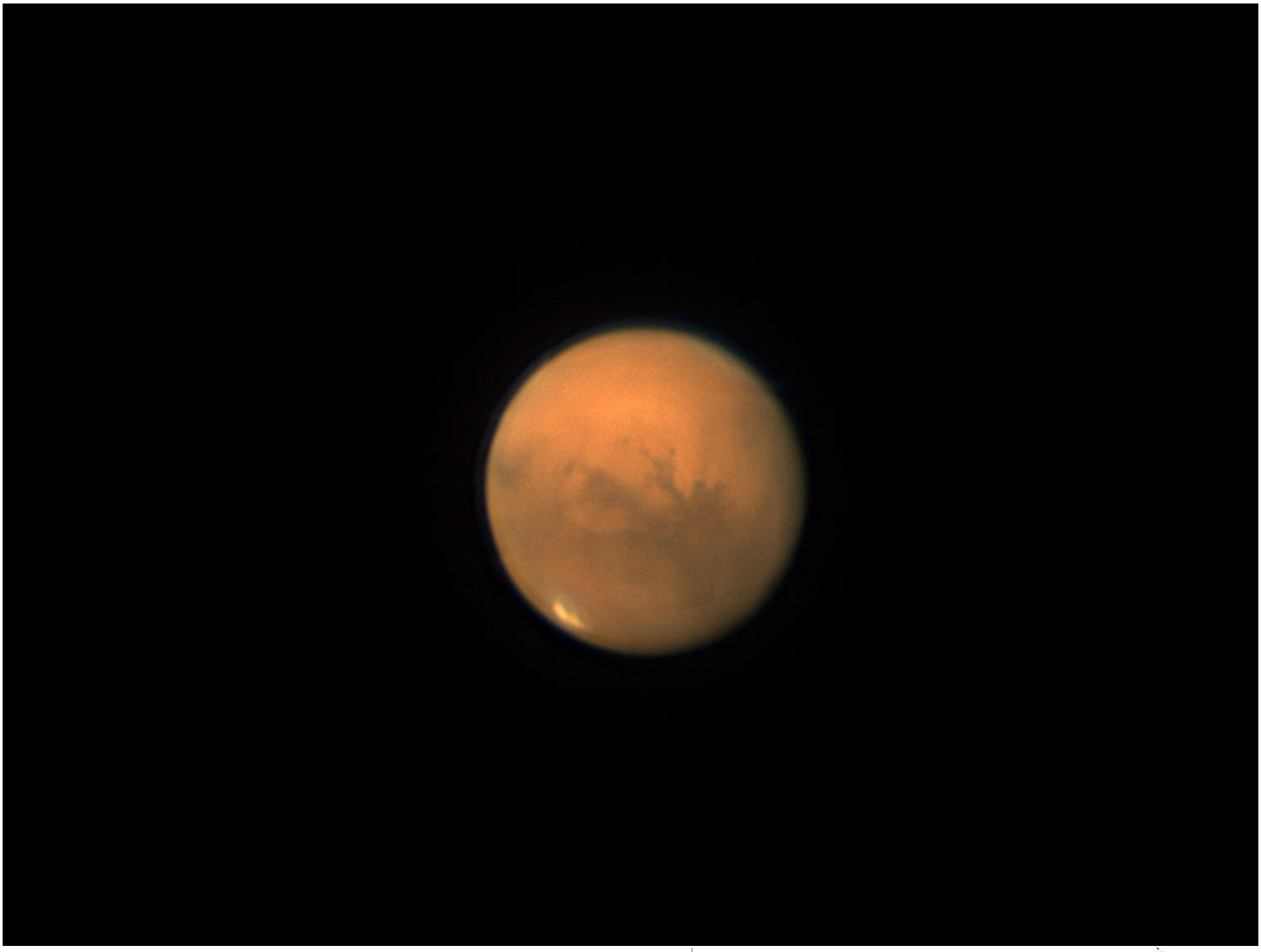


Virtual "Stargazing" with Doug Bock. He did a session of image captures of various deep sky objects and demonstrations of stacking techniques. Pictured is the Veil Nebula

W.A.S. Astro-Images

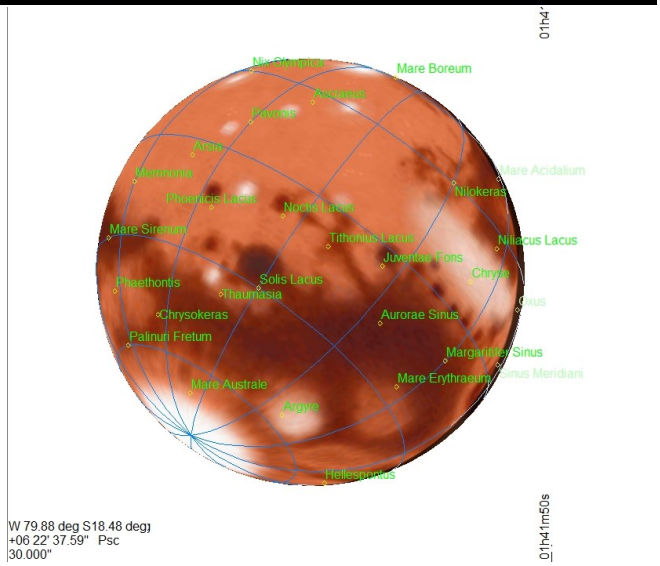
Forwarded email by Gary Ross from Gerald Persha:

The boy is <u>really</u> good! Permission presumed.



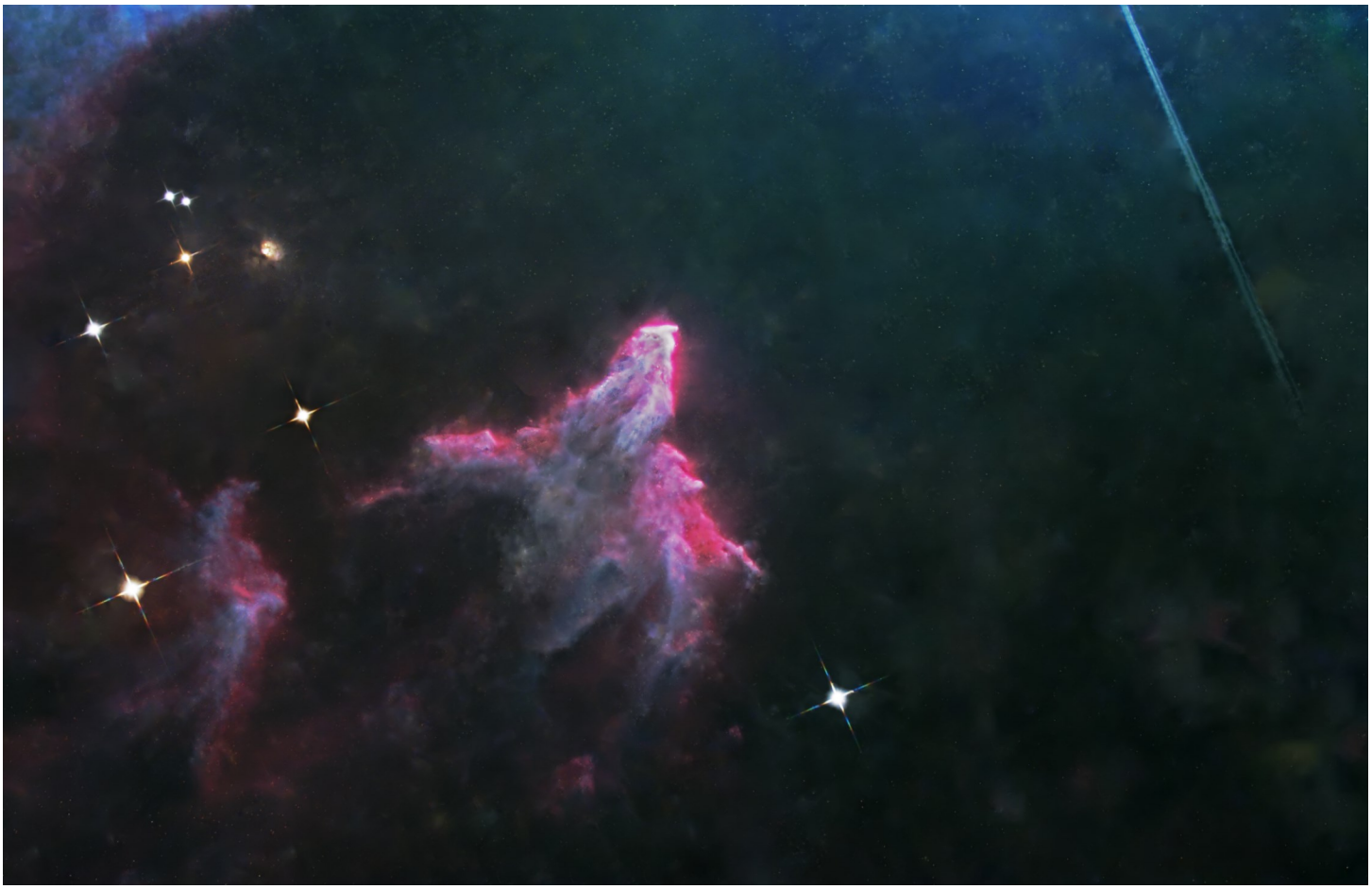
From the email:

It was better last night compared to the first time but it still is not the best for these parts. The following Mars image is the result of 5000 frames stacked. I could not go longer because I guess the computer ram filled up and buffering to disk slowed the rate down to 2-3 fps from the nominal 21 fps. The result was an 11 GByte AVI file. I have included a mars map from Guide at the time the image was taken. We live in marvelous times.



The View From C.W. Sirius Observatory

Happy Halloween!



IC 63 – The Ghost of Cassiopeia

IC 63, also known as the Ghost Nebula, is located 550 light-years away, near the bright star Gamma Cassiopeiae, or Navi, in constellation Cassiopeia. Since this object is in the heart of the Milky Way where there are a very large amount of stars, I have removed most of the stars from the image to enhance the details if the nebula.

The constellation of Cassiopeia, named after a vain queen in Greek mythology, forms the easily recognizable "W" shape in the night sky. The central point of the W is marked by a huge star named Gamma Cassiopeiae, also known as Navi. The bluish color and the diffraction spike in the upper right hand corner of the image is from this bright star Navi.

The remarkable Gamma Cassiopeiae is a blue-white subgiant variable star that is surrounded by a gaseous disc. This star is 19 times more massive and 65 000 times brighter than our Sun. When I took this

(Continued on page 11)

(Continued from page 10)

image, I purposely moved the bright star just outside the field of view so as to not overpower the photograph.

The nebula is a giant space cloud made of gas and dust. The radiation of Gamma Cassiopeiae (Navi) is so powerful that it affects the Ghost Nebula, which lies several light years away from the star. The colors in the eerie nebula showcase how the nebula is affected by the powerful radiation from this distant star. The hydrogen within IC 63 is being bombarded with ultraviolet radiation from Gamma Cassiopeiae, causing its electrons to gain energy which they later release as hydrogen-alpha radiation — visible in red in this image. This hydrogen-alpha radiation makes IC 63 an emission nebula, but we also see blue light in this image. This is light from Gamma Cassiopeiae that has been reflected by dust particles in the nebula, meaning that IC 63 is also a reflection nebula.

This colorful and ghostly nebula is slowly dissipating under the influence of ultraviolet radiation from Gamma Cassiopeiae. However, IC 63 is not the only object affected by this mighty star. It is part of a much larger nebulous region surrounding Gamma Cassiopeiae that measures approximately two degrees on the sky, or roughly four times as wide as the full Moon. The bright reflection nebula IC 59, which is part of the same region, is also located very near the Ghost nebula.

The Ghost is best seen from the Northern Hemisphere during autumn and winter. Though it is high in the sky and visible all year round, it is very dim, so observing it is challenging and requires a fairly large telescope and dark skies. I recommend using a 10" or larger scope, plus a nebula filter. Move your scope so the bright star Navi is just outside your field of view. Then use averted vision to try to locate the ghostly features.

Happy hunting and HAPPY HALLOWEEN!

About CW Sirius Observatory:

C.W. (Cadillac West) Sirius Observatory is located 15 west of Cadillac Michigan. Owned and operated by WAS member Bill Beers. The dome is an 8' Clear Skies Inc dome which houses an 11" f/10 SCT telescope, a 102mm f/7 refractor telescope, Celestron CGEM DX mount, and uses an ASI ZWO 071 color CMOS camera, as well as a QHY8L color CCD camera. The telescope can be remotely operated from inside Bills house.

Anyone interested in learning about astrophotography, or any questions regarding equipment, or how to take astrophotos using your iPhones, or any related questions, can contact Bill at: BEEZOLL@AOL.COM

Join the Astronomical League!

The mission of the Astronomical League is to promote the science of Astronomy. The major benefit of belonging to this organization is receiving the quarterly newsletter, The Reflector, which keeps you in touch with amateur activities all over the country.

Also:

- Participate in the Observing Program
- Avail yourself of the League Store
- Astronomy Books at a discount
- Attend Astronomical League Conventions

Only $7.50 annually,
(Membership starts July 1)

alcor@warrenastro.org

From the Desk of the Northern Cross Observatory

I spent a week up at the River Valley RV park where the Great Lakes Star Gaze is held. I went up on the 13th and came home on the 21st. During that time, I imaged 7 different objects. This was one of them.

IC 5146 (also Caldwell 19, Sh 2-125, and the Cocoon Nebula) is a reflection/emission nebula and Caldwell object in the constellation Cygnus. The NGC description refers to IC 5146 as a cluster of 9.5 mag stars involved in a bright and dark nebula. The cluster is also known as Collinder 470. It shines at magnitude +10.0/+9.3/+7.2. Its celestial coordinates are RA 21h 53.5m, dec +47° 16′. It is located near the naked-eye star Pi Cygni, the open cluster NGC 7209 in Lacerta, and the bright open cluster M39. The cluster is about 4,000 ly away, and the central star that lights it formed about 100,000 years ago; the nebula is about 12 arcmins across, which is equivalent to a span of 15 light years.

When viewing IC 5146, dark nebula Barnard 168 (B168) is an inseparable part of the experience, forming a dark lane that surrounds the cluster and projects westward forming the appearance of a trail behind the Cocoon.

Data: September 19, 2020
SGPro, PHD2, FocusLock
10" f/8 RC Telescope, Losmandy G11 mount
ZWO asi071mc PRO camera @ 0C, gain 300,
48 x 10 minute subs, 24 darks, 50 flats
Stacked in Deep Sky Stacker (DSS), Processed in PixInsight

Doug Bock

Presentations

Monday, October 5, 2020
Cranbrook Presentations

Main Talk:

A Lyrid meteor shower, getting thrown out of Dad's will, and a journey through the night sky

David H. Levy is a Canadian astronomer and science writer who co-discovered Comet Shoemaker–Levy 9 in 1993, which collided with the planet Jupiter in 1994. Levy was born in Montreal, Quebec, Canada, in 1948. He developed an interest in astronomy at an early age. However, he pursued and received bachelor's and master's degrees in English literature. On February 28, 2010, Levy was awarded a Ph.D. from the Hebrew University of Jerusalem for his successful completion of his thesis "The Sky in Early Modern English Literature: A Study of Allusions to Celestial Events in Elizabethan and Jacobean Writing, 1572–1620.

Levy went on to discover 22 comets, either independently or with Gene and Carolyn S. Shoemaker. He has written 34 books, mostly on astronomical subjects, and provided periodic articles for Sky and Telescope magazine, as well as Parade Magazine, Sky News and, most recently, Astronomy Magazine.

Short Talk:

"The Little Big Bangs"

What Supernovae Can Tell Us

By Anne Blackwell

The death of a high mass star, a supernova explosion, is one of the most energetic explosions in the universe. After enough material has been swept up by the outward moving shock wave from the explosion, the object becomes a supernova remnant

(Continued on page 14)

Thursday, October 15, 2020
Macomb Presentation

Dr. Straat will address the question "Is there life on Mars?" based on her recently published book "To Mars With Love." The book is the behind-the-scenes story of the Viking Labeled Release (LR) life detection experiment, one of three life detection experiments that landed on the surface of Mars during the 1976 Viking Mission. Dr. Straat worked hand-in-hand with the engineers building the Viking Biology Instrument. She recounts the challenges, crises, and the humor involved in getting the LR to Mars, as well as the unfolding of the mission as the surprising and controversial positive LR results were received from Mars.

Dr. Patricia Ann Straat was Co-Experimenter of the Labeled Release life detection experiment and member of the Biology Flight Team during NASA's 1976 Viking Mission, the first spacecraft to land successfully on Mars. She was also a Team Member of the Spectroscopy experiment on the 1971 Mariner 9 Mission to Mars which was the first spacecraft to orbit Mars. Dr. Straat earned her undergraduate degree from Oberlin College and her doctorate in biochemistry from Johns Hopkins University. After four postdoctoral years in the Department of Radiological Sciences at Hopkins' School of Hygiene and Public Health (now the Bloomberg School of Public Health), she became an Assistant Professor in that same department for two years. She joined Gilbert Levin (LR Experimenter) at Biospherics Incorporated in 1970 where she began her work with Mars and the Labeled Release experiment. Following Viking, she joined the National Institutes of Health as a health scientist administrator, retiring in 2001. She recently published "To Mars With Love," a book that was 40 years in the making and is the behind-the-scenes story of the Viking Labeled Release experiment.
(https://www.tomarswithlove.com)

(Continued from page 13)
(SNR). SNR are visible in all wavelengths, but their high energy makes them ideal for observations in the X-ray band. X-rays (0.1 - 200 keV) are far too energetic to be detected by classic telescopes - they pass straight through the mirrors instead of being reflected. In order to view X-rays, we have to use a specially designed telescope that allows photons to graze off metal walls then be collected. Special data analysis techniques of SNR allow us to detect new energy features and better understand the evolution of these objects.

Anne Blackwell is a second year graduate student in Astronomy & Astrophysics at the University of Michigan. She works with Dr. Joel Bregman using X-rays to study galaxy groups and cluster; specifically, the metal content of galaxy groups and clusters. In addition to research Anne is part of the Astronomy on Tap organization committee for Ann Arbor and recently joined the Dark Sky outreach program - a group committed to preserving Michigan Dark skies and education of light pollution problems and solution. In 2015 she graduated from the College of William & Mary with a degree in Physics.

Catch our own Dale Partin on a special Mars episode of Astronomy For Everyone:

https://www.youtube.com/watch?v=YV5hnkmLeao

In Memoriam

John Zawiskie, Curator of Geology and Paleontology at Cranbrook Institute of Science and adjunct professor at Wayne State University for 20 years, passed away Sunday night, 9/27, after his battle with ALS.

Several W.A.S. members, including myself, attended a fascinating lecture about Libyan Desert Glass that John gave to the Michigan Mineralogical Society. John and I got to discussing asteroids and meteorites, and I asked him if he knew what #AsteroidDay was - not only *did* he, I ended up lecturing about asteroids during multiple Cranbrook #AsteroidDay events!

My wife Connie met John when we were at one of these events, and John, upon learning Connie was a fossil collector, showed us some *amazing* (and some *very large*) fossils in a work room at Cranbrook.

John and I exchanged a *LOT* of emails immediately after the Hamberg Michigan Meteorite fall - John sent me images of meteorites from the fall that I've used in several lectures. John was the first person to alert me about the existence of the Greenland impact crater.

I informed Br. Guy about John's passing; he knew John and commented that John was a wonderful guy.

-Bob Trembley

WAS PRESENTATIONS

If you would like to present either a short talk (10-15 minutes) or a full-length talk (45-60 minutes) at a future meeting, please email Dale Partin at:

firstvp@warrenastro.org.

Halloween 2020 is Unique By Brad Young

You may have heard that there will be a rare full moon on Halloween this year. Since we have not had enough strange things happen this year, we need one more "never before seen" natural phenomenon to cap off what has been a banner year. We may not have had enough pestilence, disease, fire, smoke, hurricane, tornado, drenching rain, and parching drought to satisfy man's constant need for wonder.

Luckily, we have a "never seen" full moon right around the corner. You will probably see this story all over the news and in some articles, but I wanted to really drill down to discover what makes this particular full moon so special, perhaps even unique. So, I set up a filtering system, looking at each way the 2020 Halloween Moon is different than others, working back from the previous time that kind of moon phenomena occurred to the first time it ever occurred.

Full Moon

I started off with how often a full moon occurs. This seems trivial; we all know the Lunar Cycle (synodic) is 29 or 30 days, but you must start somewhere. Before this Halloween there will be a full Harvest Moon on October 1st, 2020. As for the first occurrence of the Full Moon, I doubt anyone was around to see it, or at least is not still around to tell us about it.

Halloween

Maybe another "given", but when did Halloween start? If you've ever watched "Drunk History" you know that it came into its current form in 1914 when Ms. Elizabeth Krebs of Hiawatha Kansas got sick of her garden being trampled. But Halloween as a pagan festival dates to at least the birth of Christ when Picts and Celts celebrated Samhain. They lit bonfires and wore costumes to trick and spook the spirits to go away and leave them alone.

Saturday Night

Halloween falls on Saturday night, not surprisingly, every few years. In fact, the last one was only in 2015. My next filter was when was the last full moon on a Saturday night? That occurs often too, as anyone who has ever tried to observe on a weekend knows. If you are not too picky about exactly what Saturday night means then

(Continued on page 16)

(Continued from page 15)
the last such full moon was at 1:33 a.m. on February 9th, 2020, just a bit over into Sunday morning. I didn't bother with tracking down when we started calling it Saturday, because it was a long time ago. Besides, what we call Saturday has always been, in some fashion, extant as long as there have been weeks. The first full moon on a Saturday night is probably also lost to antiquity.

Blue Moon

Well then what about the fact that this year, the Halloween Full Moon is also a "blue moon"? After all, a second full moon in one month is uncommon. Unfortunately, there have been several different definitions of what a "blue moon" is. The earliest example I can find of a blue moon was the older definition of it when it appeared blue to the eye. This subjective report first seems to be documented in 1883 when the island volcano of Krakatoa blew up. Sunsets and the rising full moon appeared blue because the red light was scattered by trillions of tons of ash, blown clear around the world by the jet stream and trade winds. Boy does that sound familiar…

If you want to wait until people started defining the blue moon as a second full moon in a month or fourth full moon in a season, that wasn't really clarified until the 1980s. There seems to still be some doubt as to when the seasonal use started, but that doesn't really affect this study. And blue moons aren't that rare, the last one occurring on March 31st, 2018. Note: if you ever want to go down a "Wikipedia hole" just start by googling blue moons.

OCTOBER 2020

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Blue Moon on Halloween

But requiring it to be a blue moon on Halloween narrows it down to be the same as the last full moon on Halloween. Every full moon on Halloween must be a blue moon, if you use the second full moon in the month definition. Since the lunar cycle is only 29.5 days, any full moon on Halloween would, by this definition, always be blue. The last blue Moon on Halloween on a Saturday night was October 31st, 1925. It's arguable whether that full moon was called blue, but just in case someone somewhere had adopted that tradition by then, I counted it.

Blue Moon on Halloween with Mars Near Opposition

I guess having to look back to the days of flappers surprised me a bit, but then I thought what about the fact that Mars is very near opposition and will be a big red bright light near the full moon? It turns out that you only have to go back to 2005 to

(Continued on page 17)

(Continued from page 16)
find a Mars closer to Earth on Halloween. In fact, it was closest to Earth on October 30, 2005 for that opposition, so it was closer than it will be this year. I didn't bother looking up when the last time Mars was at opposition on a full Halloween Moon. That promised to take me to a whole bunch of astrology sites that I really didn't want to look at.

Blue Moon on Halloween on Saturday with Mars Near Opposition and Daylight-Saving Time Ends

So finally, I looked at my last filter. This year the full blue Moon on a Saturday Halloween with blazing red Mars right near it also happens to occur on the night we turn our clocks back at the end of daylight-saving time. This my favorite day of the year because daylight saving time is finally over, and we can observe at decent hours. This year's unique lineup of cycles means that Halloween night will also seem to be an hour longer, in a way. So, I wondered when the last time that happened in conjunction with a full moon on a Saturday night. Of course, the end of daylight-saving time always happens on Saturday night / Sunday morning, so that was a given.

Much to my delight I finally found something that makes this year's situation completely unique in all human history. We didn't start using daylight saving time, except during wars, until 1966. So, since the last Saturday Full Blue Halloween Moon was in 1925, that would have been the first chance to have it on a change the clocks night. But we weren't at war in 1925, hence not on daylight saving time. In fact, it had recently been abolished, despite a veto by President Wilson, because it was so unpopular. This was one of the few times a bill has bucked a presidential veto – driven mainly by farmers, who hated the shifting time. Besides, in all cases during both world wars, the clocks were not turned back on the first Sunday in November, it was always the last Sunday of October.

Resolved: 2020 is Unique

So it comes down to the fact that this full Hunters Moon, which happens to be blue, occurs on a Saturday night, which happens to be Halloween, and happens to be the Saturday night that we turn our clocks back in 2020.

Now you will be able to tell your grandchildren that you saw something happen in 2020 that no one has ever seen before. And that's when they will turn to you and say, "You're going to have to be a lot more specific, Grandpa!"

-Brad Young
Astronomy Club of Tulsa
https://www.astrotulsa.com/Default.aspx

W.A.S.P. Photo and Article Submissions

We'd like to see your photos and articles in the W.A.S.P. Your contribution is ESSENTIAL! —
This is YOUR publication!
Send items to: publications@warrenastro.org

Documents can be submitted in Microsoft Word (.doc or .docx), Open Office (.ods), or Text (.txt) formats, or put into the body of an email. Photos can be embedded in the document or attached to the email and should be under 2MB in size. Please include a caption for your photos, along with dates taken, and the way you 'd like your name to appear.

The Long Summer of 2020

When Earth crossed the summer solstice on June 21, 2020, we were all mired in the midst of the most serious pandemic in more than a century. Summer is the most important season for me for one reason: it was many years ago, during the Summer of 1960, that I fell in love with the night sky. This summer just concluded had a start filled with disappointment.

On June 21, 1960, I was riding my bicycle to school when its front wheel struck a curb and broke my arm. My cousin, Roy Kaufman, gave me a book about the planets as a get-well present. I read and reread that book all summer, and by September I was enjoying my first look through a telescope, at the planet Jupiter. The view of the planet with its bands of color, combined with its four big moons, was one I have never forgotten. To this day Jupiter remains my favorite planet. As I never tire of looking at this world, I was able to view Jupiter this summer also.

The summer of 2020 began with a huge handicap, but something appeared in the sky that quickly altered my perception. That something was Comet Neowise. Not since Comet McNaught in 2007 has such a bright comet graced our sky. I first saw Neowise on the morning of July 5. The full Moon was setting in the west, and the sky was brightening rapidly in the east. With a pair of good binoculars I found Capella, then carefully moved them toward the eastern horizon. Suddenly, the beautiful comet made its appearance with a bright glowing head and a brilliant tail. As the comet faded slightly over the next few days its tail grew longer.

Comet Neowise might have been a highlight of this Summer season, but there were other highpoints. Over the course of the summer I enjoyed sixteen "AN" or all night observing sessions, nights under the sky that went on from dusk to dawn. Most of these were interrupted by lengthy periods of rest during which I would watch some television, but the final one was not. Session 21755AN2 began when my friend David Rossetter and I observed for several hours at the dark site run by the Tucson Amateur Astronomers Association. One back home, I enjoyed more hours searching for comets until dawn spelled an end.

Searching for comets is something I have enjoyed for many years. It is an activity of which I never tire, even though I have not found a new comet since October 2006. After all, the search is what is so important to me. It is refreshing, it is fun, and it recharges my soul and my spirit.

The picture is of Dave's Jarnac Observatory, its main "Shaar structure, Shoemaker-Levy dome, and "Canada" building. Picture by David Levy from the roof of his home

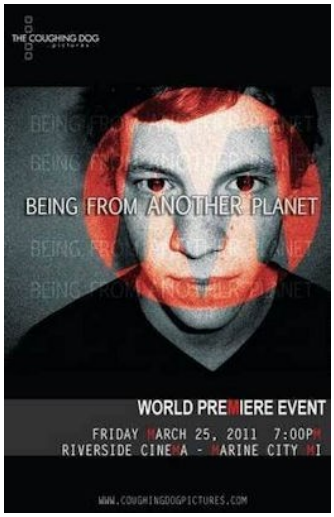
Movie Review with Diane Hall

Being From Another Planet (2011)

(https://www.imdb.com/title/tt1961199/)

"Michigan is not the only place in the world where people feel alienated."

So, we interrupt the period melodramatics of Astronaut Wives Club to bring you a movie review in keeping with the theme of Mars Opposition Month. Our Publications Chair requested this one as, in addition to being about Mars… sort of… Being From Another Planet was filmed locally by Michigan-based The Coughing Dog Pictures, giving it a unique appeal for us Michigan astronomers.



The film opens with a voiceover between distressed astronaut David Andersen and his CAPCOM down on earth; Andersen is delivering the baby of his colleague Dr. Vera Kushnir. It's a boy. The opening title sequence delivers the backstory in a fairly stylish manner; Andersen and Kushnir (a Russian cosmonaut) had a presumably forbidden romance resulting in Martin Andersen-Kushnir, the first baby born on Mars. Once the trio is back on earth, Kushnir splits to marry a Russian celebrity and "M.A.K" is raised by his dad, in America, in a swirl of tabloid publicity.

Cut to Marine City, Michigan. Martin (Brian Hosler) is now a teenager with a massive chip on his shoulder and the producers clearly spent all the budget on the first two minutes of the movie. Martin lives with his dad in an unremarkable home, living unremarkable lives now the press has tired of the Mars baby. Astronaut Dad is enough of a sad sack himself that he stands around in their living room gazing at old news clippings framed on the wall and treasures the hideous vintage suit he once wore to the White House. Marine City High School boasts incompetent staff and a gang of mediocre bullies who operate without any restraint from said incompetent staff, giving it the feel of an early Todd Solondz flick like Welcome to the Dollhouse; for a movie filmed on site with apparent civic pride ("to show what Michigan has to offer," say the producers) this ain't much of an endorsement.

Into this little slice of hell comes a new girl (Taylor Parker) who tries to make friends with Martin and is promptly rebuffed. Martin sketches soulfully while emo-bad acoustic music plays. New girl doesn't take the hint and tries to get through Martin's defenses. Love blooms along the Marine City waterfront, or rather Martin develops something approximating a bilateral human relationship for the first time ever. Will "Martin the Martian" become socialized at last, or will the unrestrained bullies of Marine City High School and their adult enablers destroy his attempt to join the people of Earth?

Marine City gonna Marine City, at which this movie stops being an after-school special with "Mars baby" as its premise and things get… weird. And funny. Complete with product placement from Michigan's own Biggby coffee. Life for the new King Martin of Mars gets even more complicated when he takes in his first refugee from Earth (Ross Wyngaarden). Part darkly comic revenge fantasy, part coming-of-age story, and part cautionary tale about bonding with the first misfit who shows up at your doorstep, Being From Another Planet is like nothing I've ever seen before.

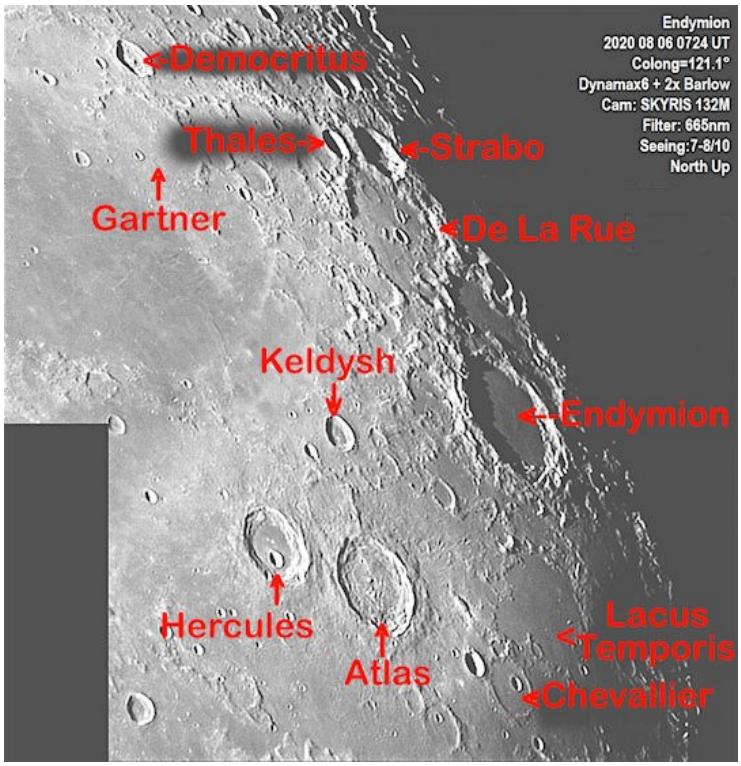
Is it a good movie? The acting isn't any great shakes. The production values are in the toilet. The script is incredibly loopy, shifting through moods and even genres and then cycling back like Mars in retrograde. But it's a brave movie, a committed movie, in a way one doesn't often see from major studios; writer/producer Joe Parcell deserves kudos for taking a ludicrous premise and seeing it through to its bleakest implications. And I deserve the Johnnie Walker Black on the rocks I drank to get me through watching it.

Three moons, possibly more if you don't care about the production values and/or really want to see Marine City onscreen.

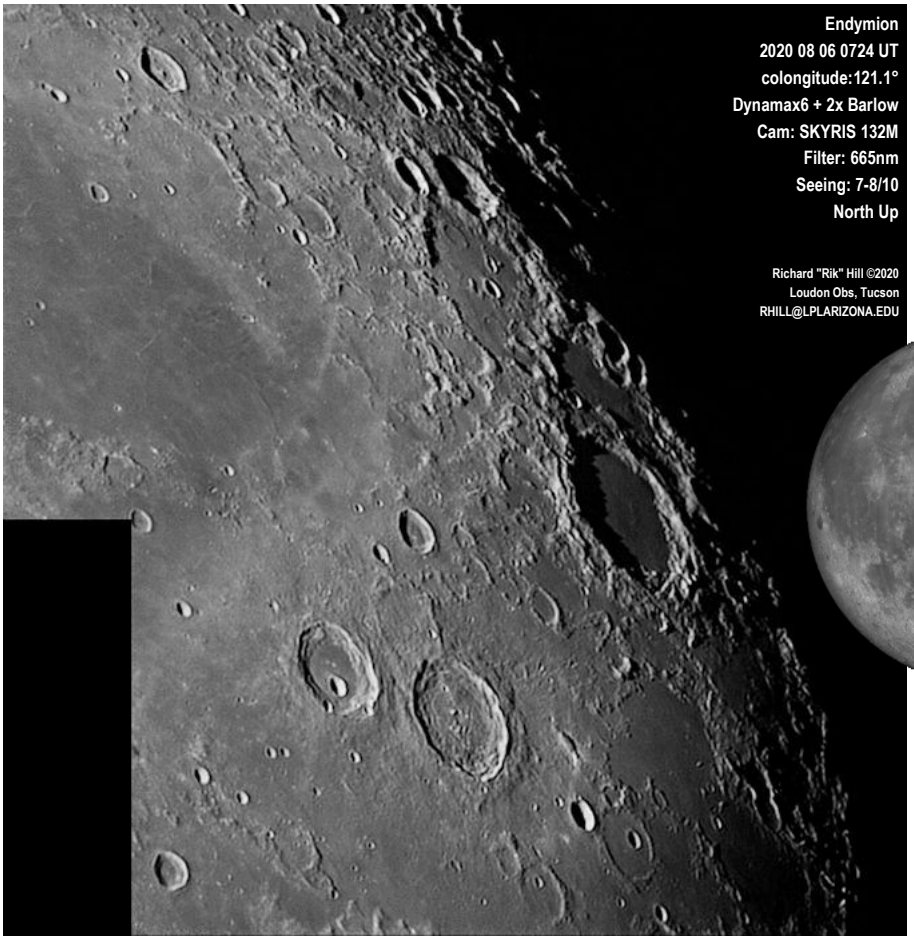
Over the Moon with Rik Hill

The Ends

Normally a more foreshortened feature, at this libration we get a good look into Endymion, the large 125km diameter crater just right of center. As lunar night approaches we see the wonderful shadows crawling across its floor. The two large craters below and to the left (west) are Atlas (90km) and the smaller, younger Hercules (71km) with the satellite crater Hercules G (13km) on its floor. Many observers think these two are much alike but actually they are remarkably different with a smooth flat floor in Hercules and rimae, and roughness on the floor of Atlas. Even the ejecta is very different in the two with Atlas having a thick ejecta blanket that even covers over a much older crater to the north.



Above these two is the teardrop shaped crater Keldysh (34km). Below and to the right of Atlas is a ghost crater seen best at this sun angle, Chevallier (54km), with small satellite crater Chevallier B (13km) contained within its walls. To the right of Chevallier is a flat figure-8 shaped area that is Lacus Temporis some 257km long.



Another smaller mare-like region that lies just north of Endymion is unnamed. North of this region, a hard to trace, ruined crater De La Rue with a 14km crater in the middle, De La Rue J. On its north wall are a couple more craters Strabo (56km) and to its left Thales (32km). At the top of this image is a rather polygonal crater Democritis (41km) and below it another large ghost crater Gartner (105km) opening onto easternmost Mare Frigoris similar to Fracastorius but a much weaker copy. So one way you can remember the layout is that at one END of Mare Frigoris you will find ENDymion!

This image was made from two 1800 frame AVIs stacked using AVIStack2 (IDL) then finish processed with GIMP and IrfanView.

Location maps by Ralph DeCew

History S.I.G.

October 1983

An announcement of a big camping event: The 1983 Astrofest (Chicago Astronomical Society). From our membership, we have "The Father of Science" (Galileo Galilei) by Brian Johnston, then another announcement: "Canadian-American Observing Session" taking place Saturday, October 8, 1983. Finally, a reprint from the Kansas City Astronomical Society's August issue of *Cosmic Messenger* "Iras" and Charles Douglas Are Stars Again.

October 1993

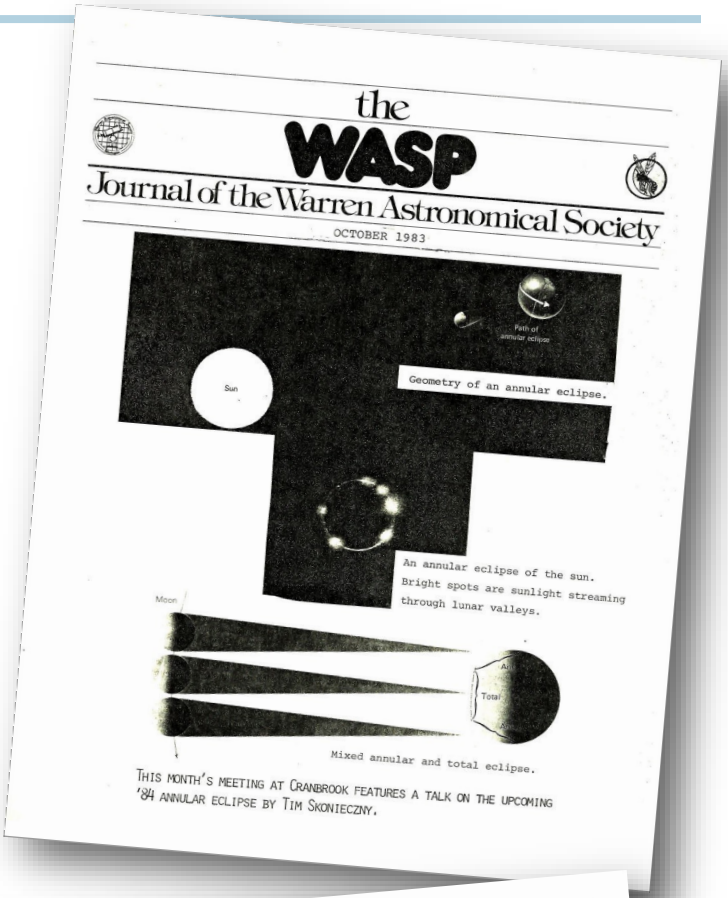
The solo member contribution to this issue is "Computer Chatter" by Larry Kalinowski. In other news, we have updates on the Mars Orbiter (not good news, however) through "NASA SpaceLinks- (A service of NASA to club newsletters)

The issue finishes off with "At the Telescope- Open Star Clusters"

From the Scanning Room

I have acquired several "new" books on lunar matters from an astronomical library donated to our club. While this probably should be filed under Armchair Astronomy, they are old books, so... History! Besides, nothing else has come out of the scanner lately. Said books are: The Moon (1955) by H.P. Wilkins and Patrick Moore; Physics and Astronomy of the Moon (1962) by Zdeněk Kopal; Strange World of the Moon (1959) by V.A. Firsoff; The Moon -a Russian View (1962), AV Markov, editor; and Structure of the Moon's Surface (1961) by Gilbert Fielder. These should provide some good material for the Armchair Astronomer.

Dale Thieme,
Chief scanner



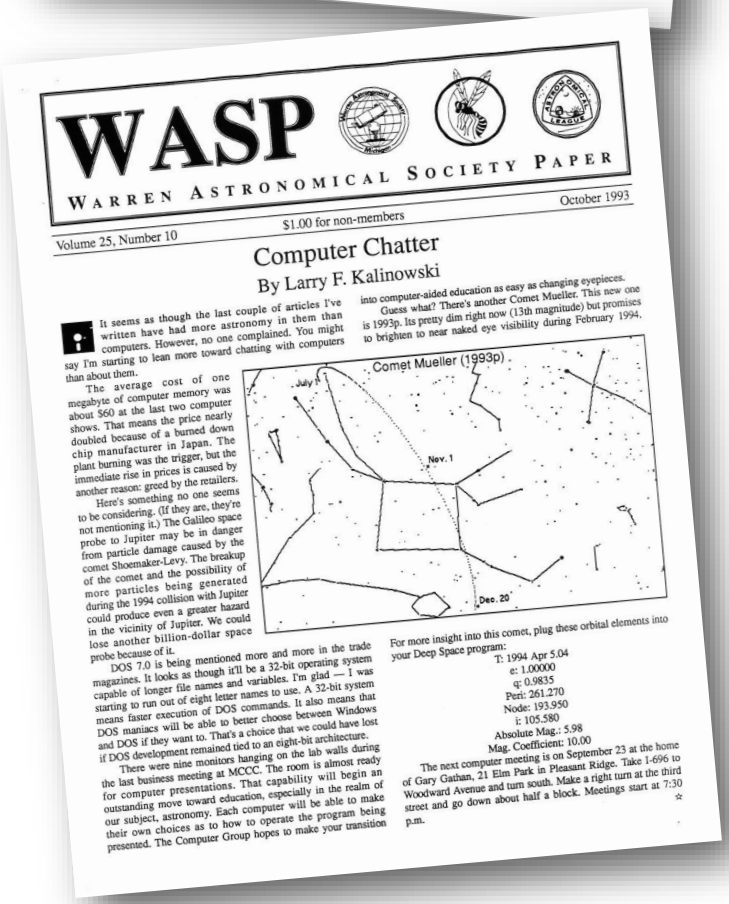
the WASP
Journal of the Warren Astronomical Society
OCTOBER 1983

Geometry of an annular eclipse.

An annular eclipse of the sun. Bright spots are sunlight streaming through lunar valleys.

Mixed annular and total eclipse.

THIS MONTH'S MEETING AT CRANBROOK FEATURES A TALK ON THE UPCOMING '84 ANNULAR ECLIPSE BY TIM SKONIECZNY.



WASP
WARREN ASTRONOMICAL SOCIETY PAPER
Volume 25, Number 10 — $1.00 for non-members — October 1993

Computer Chatter
By Larry F. Kalinowski

It seems as though the last couple of articles I've written have had more astronomy in them than computers. However, no one complained. You might say I'm starting to lean more toward chatting with computers than about them.

The average cost of one megabyte of computer memory was about $60 at the last two computer shows. That means the price nearly doubled because of a burned down chip manufacturer in Japan. The plant burning was the trigger, but the immediate rise in prices is caused by another reason: greed by the retailers.

Here's something no one seems to be considering. (If they are, they're not mentioning it.) The Galileo space probe to Jupiter may be in danger from particle damage caused by the comet Shoemaker-Levy. The breakup of the comet and the possibility of more particles being generated during the 1994 collision with Jupiter could produce even a greater hazard in the vicinity of Jupiter. We could lose another billion-dollar space probe because of it.

DOS 7.0 is being mentioned more and more in the trade magazines. It looks as though it'll be a 32-bit operating system capable of longer file names and variables. I'm glad — I was starting to run out of eight letter names to use. A 32-bit system means faster execution of DOS commands. It also means that DOS maniacs will be able to better choose between Windows and DOS if they want to. That's a choice that we could have lost if DOS development remained tied to an eight-bit architecture.

There were nine monitors hanging on the lab walls during the last business meeting at MCCC. The room is almost ready for computer presentations. That capability will begin an outstanding move toward education, especially in the realm of our subject, astronomy. Each computer will be able to make their own choices as to how to operate the program being presented. The Computer Group hopes to make your transition into computer-aided education as easy as changing eyepieces.

Guess what? There's another Comet Mueller. This new one is 1993p. Its pretty dim right now (13th magnitude) but promises to brighten to near naked eye visibility during February 1994.

Comet Mueller (1993p)
July 1
Nov. 1
Dec. 20

For more insight into this comet, plug these orbital elements into your Deep Space program:
T: 1994 Apr 5.04
e: 1.00000
q: 0.9835
Peri: 261.270
Node: 193.950
i: 105.580
Absolute Mag.: 5.98
Mag. Coefficient: 10.00

The next computer meeting is on September 23 at the home of Gary Gathan, 21 Elm Park in Pleasant Ridge. Take I-696 to Woodward Avenue and turn south. Make a right turn at the third street and go down about half a block. Meetings start at 7:30 p.m. ☆

Adventures in Armchair Astronomy

The Crater Wars

"Crater Characters. In the study of lunar physiography, or physiognomy, if you prefer — interest naturally centers in the craters, for these are the dominant features. All theories begin with them; and, before examining the theories, it will be well to place clearly in view the characteristics of the lunar craters."— G. K. Gilbert, THE MOON'S FACE

"The Moon is not Boring" talk by Jeff MacLeod in August 2020 featured the physics of the Moon's orbit. A great talk, but time didn't permit covering the other interesting bits of the Moon—like the craters. If you didn't catch his talk, here it is: https://www.youtube.com/watch?v=k9t2NXfX2Yc.

Selenography could be said to have started with Galileo (1564-1642), when he recognized mountains on the moon through his telescope, estimated their size and mapped the terrain. Naming the features soon commenced, beginning with Johannes Hevelius (1611-1687), who named the features after those found on Earth (the crater, Copernicus, was labeled "Mt Etna" for example.) Later, Giovanni Battista Riccioli (1598-1671) renamed the features to honor personages in astronomy, philosophy, mathematics, and theology (Mt Etna became Copernicus.) Only ten of the Hevelius names remained. Riccioli also called the large gray expanses seas and the smaller ones, marshes- which are still used. His term for the highlands, "terrae", failed to make the modern cut. With the mapping of the moon a "done deal" (refining the map is always an ongoing process), attention turned to the origins of the Moon's features.

Volcanism theory took root and thrived, its adherents dismissing any argument for impacts, even though none of their points were data driven. One proponent of volcanism, William H. Pickering (1858-1938), gave these reasons to reject impact theory (with rebuttals from *The Modern Moon*):

If the Moon's myriad craters are due to impact, why are there not more of them on Earth? Improved *technology* answers that question, about 200 impact craters have been mapped and that a great many more must have been erased by erosion and plate tectonics, a process that Pickering would not have known.

The only known terrestrial meteorite crater [in 1920] *is Meteor Crater, Arizona, which unlike lunar craters has no central peak.* The mistake here was the failure to notice that small *lunar* craters the size of Meteor Crater (only 1 km wide) also lack such peaks! Central peaks only become common in lunar craters larger than about 15 km.

Lunar craters are nearly circular. but projectiles should come from all directions, so impact craters should be elliptical. This argument would be valid if impact craters were formed simply by the gouging action of a falling projectile. However, mathematical analyses and hypervelocity (speeds of kilometers per second) impact experiments later demonstrated the accuracy of impact theory.


James Nasmyth

The "volcanists" proposed model was based on earth-bound volcanoes-which bore little resemblance to lunar craters. Several mechanisms were proposed to account for the "crater shape" including, at one time, bursting magma bubbles (an idea that gained little traction). In *The Moon* (1955 edition), HP Wilkins and P Moore reference the work of James Nasmyth (1808-1890) to bolster their volcanic credibility. I located a PDF of Nasmyth's book, *The Moon: Considered as a Planet, a World, and a Satellite* (1874); On the surface, many of his points about volcanic origins for craters seem to make sense, but his direct comparison between earthly volcanos and lunar craters, with an imperfect understanding of the mechanism for volcanos may have caused misdirection. Even Nasmyth admitted to problems with getting volcanism to fit and concluded:

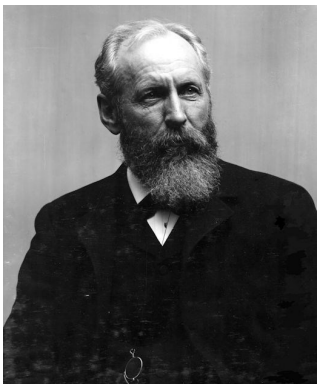
But the truths of nature are for ever playing at hide and seek with those who follow them: —the dogmas of one era are the exploded errors of the next. – J. Nasmyth

While Mr. Nasmyth was publishing his theory of vol-

(Continued on page 23)

(Continued from page 22)

canism, the chief geologist of the United States, Grove Karl Gilbert (1843-1918) went to the Arizona crater (then known as Coon Butte) to study it, decided, against his intuition, that it was caused by some sort of volcanically induced steam explosion. That set crater theory back 50 years. He later made amends in a paper he published, *The Moon's Face; A Study of the Origin of Its Features* (1892), where he considered the many theories of the time and concluded that impact cratering the likeliest method. Unfortunately, as in too little, too late- this paper wasn't published where many astronomers would read it (the *Bulletin of the Philosophical Society of Washington*). His conclusion was dismissed by, among others, the European geologist, Eduard Suess, by virtue of his prestige rather than any proof to the contrary (Suess virtually knew nothing about the moon!). With Suess and company, it was dogma: Lunar volcanos were the culprit behind craters-full stop.

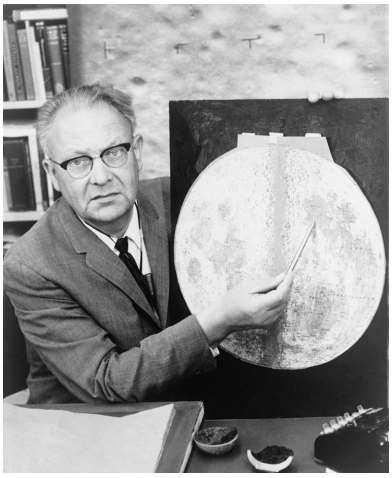


Grove K. Gilbert

Ralph B. Baldwin

The problem that selenologists had at the time was that impact speeds were outside human experience. In their thinking, things like shallow, slow moving impact angles should produce oval depressions, to have all impactors descend straight down to the moon defied orbital mechanics. It wasn't until Ralph Baldwin (1912-2010), who applied his experiments with high energy impacts (explosive projectiles) while developing proximity fuses for bombs, noticed the similarities to lunar craters. Finally the incredibly high energy needed (think vaporizing rocks) for circular crater formation made sense. He wrote *The Face of the Moon* where he challenged the volcano theory with a data-driven impact theory, but is dismissed (there is a pattern forming here). This only served to make him double his efforts and write a second book, with more data (*The Measure of the Moon*, 1963.)

Meanwhile, Baldwin's 1949 book came to the attention of two well-known and respected astronomers, Harold Urey (1893-1981) and Gerard P. Kuiper (1905-1973), who read his book and agreed—apparently data outweighed opinion in their minds. They championed the impact theory. When impact theory explained the problems volcanism couldn't solve. Eventually, the "volcanists" had to fold their tents and leave the battlefield (although a few held fast, even when the samples came back from the moon-displaying impact shock.)

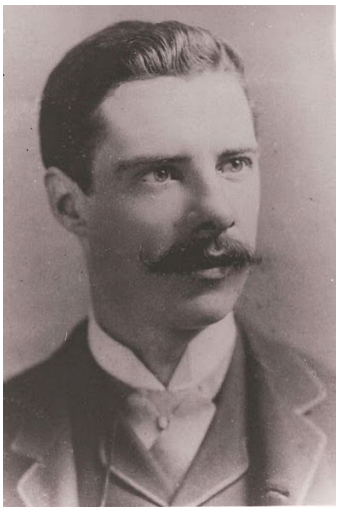


Gerard P. Kuiper

A morass of classification

I thought I'd finish the article with a list of crater classification schemes- C. Wood's *The Modern Moon* made it look pretty straightforward (see the chart on (page 22)...until I looked at the references he gave. Turns out crater classifying went through changes that reflected the theory wars.

Early on, Edmund Neison (1849-1940) classified craters as crater cones, crater pits, craterlets, craters proper, crater plains, ring plains, mountain rings, and walled plains, recognizing gradation between them—and between walled plains and maria. This fine-grained classification, based on morphological features, held sway for many years, using description, regardless the cause of formation.



Edmund Neison

When Ralph Baldwin made his lunar studies, he proposed a simpler classification method. His system sorted craters in a few types, mostly based on the amount of energy used in their formation: This system, expanded on by D. Arthur (b. 1917), also signifies the ages of the craters with (Arthur's version) Class 1 being the newest craters and Class 5, the oldest. Very sharp, clean examples are Class 1- Theophilus is an example: the bottom is not flat, the inner wall follows a smooth curve until it meets the well, defined central peak, the outer walls are sharp

(Continued on page 24)

(Continued from page 23)

and crisp. For Class 2, we turn to Clavius, the inner walls descend and then undergo an abrupt change of slope, the basin is leveled out and the central peak is small, multiple and eccentric; the walls are massive, but not crisp like Theophilus. On to Class 3- Maginus where the same description could be applied from Clavius, but with a less defined rim. At Class 4- (Baldwin gives as an example a great unnamed crater east of Walter), describing it as shallower with only a hint of a central peak and just a low rim. Class 5 craters seem only to be hinted at (flooded with the dark material of the maria) and Baldwin/Arthur gave no examples I could find.

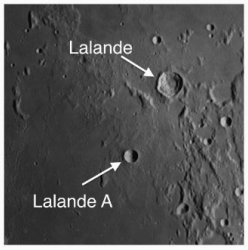
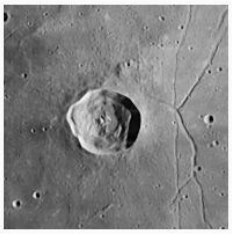
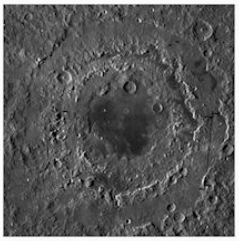
Finally, there arose a letter system, going by morphology again, applied by the Lunar and Planetary Institute:

ALC-(Albategnius C): bowl-shaped craters with smooth rims, diameters up to 20 km. Note that "bowl-shaped" is used by some investigators (e.g., Smith and Sanchez, 1973) to denote a lack of rim terraces or slumps; here it means only that there is no break in slope between crater wall and floor, i.e., the wall and floor are a continuous surface.

BIO-(Biot): small, flat-floored craters, with similar morphology and diameter range as ALC but with a flat floor having a clear break in slope at the contact with the crater wall.

(Continued on page 25)

My Kind of Classification (from *The Modern Moon*)

TYPE	EXAMPLE	DESCRIPTION	IMAGE
Simple craters	Lalande A	Up to ~15K diameter, round or flat -bottomed bowl, no central peak	
Complex craters	Triesnecker	15-20K; jumbled, collapsed inner wall, central peak	
Larger complex craters	Copernicus	20K+, terraced inner wall, flat plain of melted material, central peak	
Impact basins	Orientale Basin	300-2500K, no central peaks, multiple rings of surrounding mountains, flooding of interior with melted material.	

(Continued from page 24)

SOS-(Sosigenes): relatively shallow craters with broad, flat floors and terrace-free, narrow walls; diameters vary from 5 to 30 km. SOS craters have wider floors than BIO craters.

TRI-(Triesnecker): scalloped-walled craters typically 15 to 50 km diameter with subangular or scalloped outline; broad often roughly concentric slump masses on wall with flat floor partially or completely obscured by slumped material ("swirl texture" of Smith and Sanchez, 1973). Terraces may occur, but scallops dominate.

TYC-(Tycho): multiple tiers of terraces, crenulated rim crest, large flat floor, diameters 30 to 175 km.

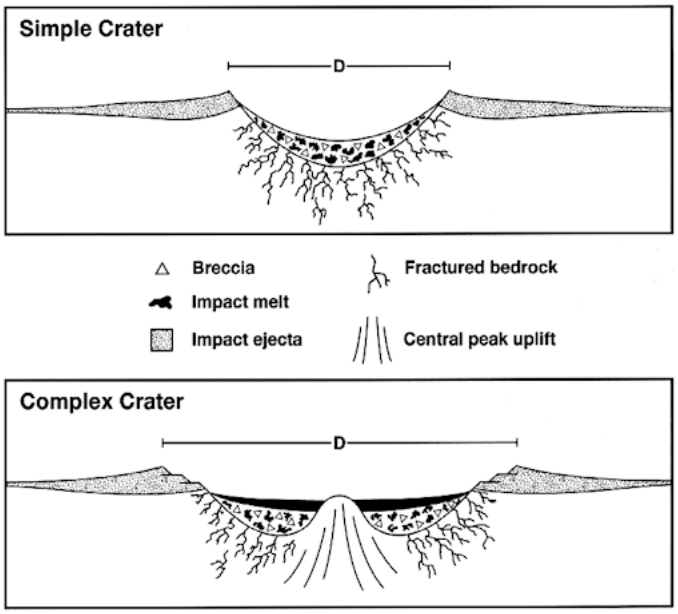
We've also used craters to determine the moon's timeline (take with a grain of moondust.) Crater counting, comparing overlaps, and classifying degradation yielded a timeline for the Moon:

Pre-Nectarian 4,533 million years ago to 3,920 million years ago

Nectarian 3,920 million years ago to 3,850 million years ago

Imbrian 3,850 million years ago to about 3,800 million years ago (Early)

Gilbert Crater, in spite of the rocky course he set impact theory on, G. K. Gilbert gets a crater. 3° 12′ 0″ S, 76° 0′ 0″ E , if you want to look for it.



3,800 million years ago to about 3,200 million years ago (Late)

Eratosthenian 3,200 million years ago to 1,100 million years ago

Copernican 1,100 million years ago to the present day

There is no end of mischief you can get into when it comes to lunar craters. Next I planned to drown myself in the Maria, but since Hurricane Sally came storming through, I'm heading back to my armchair.

-Dale Thieme

Resources:

The Modern Moon, Charles A. Wood, ISBN-10: 0933346999

Luna Cognita, Robert A. Garfinkle, ISBN-10: 1493916637

Face of the Moon, Ralph B. Baldwin (1949)

The Measure of the Moon, Ralph B. Baldwin (1963)

The Moon, H. P. Wilkins, Patrick Moore (1955)

Online:

The Moon and the Condition and Configuration of its Surface, by Edmund Neison, London, 1876.

The Moon: Considered as a Planet, a World, and a Satellite, James Nasmyth, (1874) Chap. 1, pg. 8.

The Moon's Face; A Study of the Origin of Its Features. By G. K. Gilbert -Address as Retiring President of the Philosophical Society of Washington, Delivered December 10, 1892.

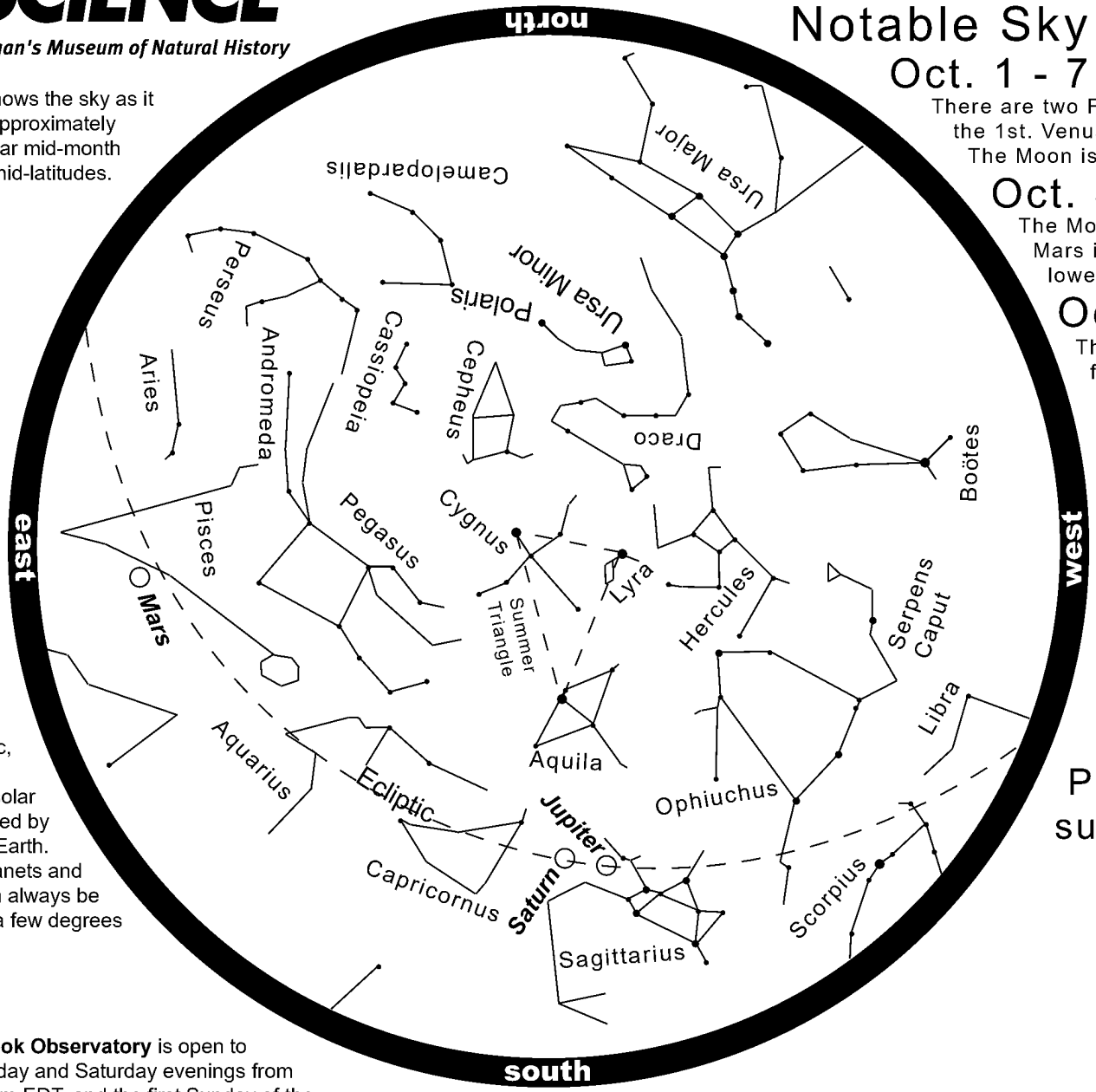
CRANBROOK INSTITUTE OF SCIENCE

Michigan's Museum of Natural History

OCTOBER 2020

Notable Sky Happenings

This chart shows the sky as it appears at approximately 8pm EDT near mid-month at northern mid-latitudes.



What is that dashed line? It's the ecliptic, the reference plane of the solar system, defined by the Sun and Earth. The major planets and the Moon can always be found within a few degrees of this plane.

The Cranbrook Observatory is open to the public Friday and Saturday evenings from 8:30 - 10:00pm EDT, and the first Sunday of the month from 1:00 - 4:00pm for solar viewing. Come have a look through our 6" telescope! For observatory information visit http://science.cranbrook.edu/explore/observatory

Oct. 1 - 7

There are two Full Moons this month. The Harvest Moon is on the 1st. Venus is upper right of Regulus on the 2nd (E morn.). The Moon is upper left of Mars on the 3rd (WSW morning).

Oct. 8 - 14

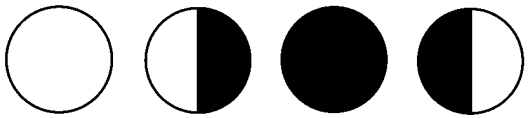
The Moon is above Venus on the 13th (E morning), and Mars is at opposition and its brightest. Moon is at the lower left of Venus on the 14th (E morning).

Oct. 15 - 21

The Orionid meteor shower (produced by debris from Halley's Comet) peaks on the night of the 21st-22nd. Expect to see 20 meteors per hour.

Oct. 22 - 31

Moon forms a triangle with Jupiter and Saturn on the 22nd (SSW eve.). On the 29th the Moon is below Mars (E eve.). The month's second Full Moon ("Blue Moon") is on the 31st.



Now Showing

Planetarium programs are suspended.

For astronomy information visit http://science.cranbrook.edu

Stargate Observatory

Special Notice

Due to the measures taken during the Covid-19 pandemic On-site Star Parties and group events are cancelled.

During this time, you are encouraged, when the skies co-operate, to join the livestream with Northern Cross Observatory on the open house schedule (4th Saturday of the month)

Past livestream are available on the Warren Astronomical Society's YouTube channel:

https://www.youtube.com/channel/UC12jUX4Gmweg6fTtUuqa8CQ

Observatory Rules:

1. Closing time depends on weather, etc.
2. May be closed one hour after opening time if no members arrive within the first hour.
3. Contact the 2nd VP for other arrangements, such as late arrival time. Call 586-909-2052.
4. An alternate person may be appointed to open.
5. Members may arrive before or stay after the scheduled open house time.
6. Dates are subject to change or cancellation depending on weather or staff availability.
7. Postings to the Yahoo Group and/or email no later than 2 hours before starting time in case of date change or cancellation.
8. It is best to call or email the 2nd VP at least 2 hours before the posted opening with any questions. Later emails may not be receivable (secondvp@warrenastro.org).
9. Generally, only strong rain or snow will prevent the open house... the plan is to be there even if it is clouded over. Often, the weather is cloudy, but it clears up as the evening progresses.

Advisory: Concerns are circulating in the amateur astronomy community about COVID-19 being passed from one person to another via contact of different persons' eyes with a telescope eyepiece. While we are not medical experts, we thought we should pass on this concern. Sharing telescopes may be considered by some to be high-risk due to the possibility of eyes touching eyepieces.

Stargate Report

Stargate observatory and the Dob shed along with all equipment are in good condition as of September 12 at 6:34 pm.

The observatory will remain closed until further notice due to the COVID-19 pandemic.

Riyad I. Matti
2020 WAS 2nd VP,
Observatory Chairperson

Treasurer's Report

Treasurer's Report for 9/30/2020

MEMBERSHIP

We have 93 current members

INCOME AND EXPENDITURES (SUMMARY)

We took in $2006 and spent/transferred $510 We have $22290 in the bank $39 in checks and $655 in cash, totaling $23,006 as of 9/31/2020

INCOME

AL 2020	$67.50
calendar 2020	$150.00
Donation	$348.88
Membership	$552.00
Merch	$84.00
Renewal	$831.00

EXPENSES

Calendar Shipping Cost	30.35
PO Box 2020	92.00
Snack Reimbursement	70.00
Snack Supplies	2.12
Speaker Expense, Dinner	54.23
Speaker Expense, Driving	261.00

GLAAC REPORT 9/30/2020

Beginning Balance: $3,025

INCOME

No activity

EXPENSES

No activity

Ending Balance: $3,025

Mark Jakubisin
Treasurer

Astronomical Events for October 2020

Add one hour for Daylight Savings Time

Source:
http://www.astropixels.com/ephemeris/astrocal/astrocal2020est.html

Day	EST (h:m)	Event
01	11:00	Mercury at Greatest Elong: 25.8˚E
01	16:05	FULL MOON
02	12:09	Venus 0.1˚S of Regulus
02	22:21	Mars 0.7˚N of Moon: Occn.
03	12:22	Moon at Apogee: 406321 km
06	20:02	Aldebaran 4.5˚S of Moon
07	19:29	Moon at Ascending Node
09	19:39	LAST QUARTER MOON
10	08:18	Pollux 4.1˚N of Moon
11	07:27	Beehive 2.1˚S of Moon
12	20:59	Regulus 4.5˚S of Moon
13	18:00	Mars at Opposition
13	18:57	Venus 4.3˚S of Moon
16	14:31	NEW MOON
16	18:46	Moon at Perigee: 356913 km
19	14:12	Antares 5.7˚S of Moon
20	10:53	Moon at Descending Node
21	00:00	Orionid Meteor Shower
22	12:10	Jupiter 2.0˚N of Moon
22	22:49	Saturn 2.6˚N of Moon
23	08:23	FIRST QUARTER MOON
25	13:00	Mercury at Inferior Conjunction
29	11:13	Mars 3.0˚N of Moon
30	13:46	Moon at Apogee: 406393 km
30	16:00	Venus at Perihelion
31	09:49	FULL MOON
31	11:00	Uranus at Opposition

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If you're shopping on Amazon, make sure to use Amazon Smile. It costs you nothing, and if you select us as your charity, Amazon will donate 0.5% of every purchase you make to the Warren Astronomical Society.

Outreach Report

A big THANK YOU to the W.A.S. members who presented-at and helped support the **Astronomy at the Beach** event: Diane Hall, Dale Partin, Ken Bertin, Paul Goelz, Rebecca Blum, Jonathan Kade, Adrian Bradley and myself. During the event's two evenings, I and a several other GLAAC members were doing a LOT of behind the scenes things - I was *wiped out* on Sunday. Now that AATB is over, I'd like to see GLAAC do more promoting of its member clubs and astronomy-related dates the *rest* of the year - *stay tuned!*

If you are giving presentations or doing other astronomy outreach, *please let me know!* Use this link to send me a quick email report.

Astronomy at the Beach 2020 Stats!

Here's a quick summary of stats from the YouTube sessions for the event:

Total Views: 3881
Total Likes: 321
Total # of comments: 42
Total # of Chat messages : 1035
Watch Hours: 663.82

- These totals don't include the Ford Club, Bock, Hariri or Ottum videos as we didn't have permissions to get detailed stats from those channels.

Many of the Astronomy at the Beach events were recorded and are available for replay:

https://www.glaac.org/astronomy-at-the-beach-2020/

PLEASE! Take the Astronomy at the Beach 2020 Survey - GLAAC REALLY wants to hear from you!

https://www.surveymonkey.com/r/85RBPLD

AATB 2020 Debrief Meeting: Oct. 8 2020, at 7:00PM ***- Everyone is Welcome!***

Online at: https://umich.zoom.us/j/584733345 (Password: 0000)

W.A.S. Calendar Entry: [LINK]

Even if you can't make it to the next planning meeting, you can join the groups.io site to get emails and updates from the planning committee. https://glaac.groups.io/g/main.

(Continued from page 29)

GLAAC Board Meeting Minutes

September 10, 2020 - ONLINE, 7pm

https://umich.zoom.us/j/584733345

Call to Order:

Meeting came to order at 7:13pm, awaiting members who got into the UM licensed meeting by mistake. Note that the above URL was on the GLAAC license to test the configuration.

Jeff Kopmanis, Secretary, presided over the meeting.

Attendance:

- Jeff Kopmanis - Secretary, GLAAC; Lowbrows
- Brian Ottum - Comm/PR Directory, GLAAC; Lowbrows
- John Wallbank - VP GLAAC; Lowbrows
- Bob Trembley - Webmaster GLAAC; WAS
- Adrian Bradley - El Presidente GLAAC; Lowbrows, WAS
- Mike Ryan - Telescope Field Director GLAAC; GM
- Mike Bruno - Ford
- Paulette Epstein - Michigan Science Center
- Tim Campbell - Ford
- Tom Hagen - Oakland
- Shannon Murphy - UM Student Astronomy Club
- Gerry Chevrier -
- John Pannuto - Oakland
- Jerry ? -
- Gary ? -

Agenda

1. Review of the Schedule grid and Online Specs - Jeff Kopmanis
    a. Procedures and Particulars of how the events will work
        i. Presenters
            1. If participant count is less than 100, presenter has the option of giving out the Zoom link for increased interactivity
            2. To manage expectations, **only** the YouTube links will be published publicly, so that everyone expects the same experience. Getting a Zoom connection would be an "added bonus" rather than having to cut people off once the license limits are reached. See point 1, directly above for the condition that must/should be met to give out the Zoom URL.
            3. While not distributing Zoom URLs doesn't protect against ZoomBombers, there likely will be GLAAC admins present in the big events to prevent bombers from getting very far.
            4. Shannon suggested using the Waiting Room and lock-out features, but it was consensus that we don't want to be exclusionary.
        ii. Board/Support side
            1. An "admin How-To" will be created by Jeff for GLAAC Admins to refer to for the event startup/shutdown procedures.
    b. Participants' Q&A
        i. Questions seem to be answered during the above discussions
b. More astronomers for "Ask the Astronomer"

(Continued on page 31)

(Continued from page 30)

   a. Want to stick to professionals/academics
   b. Adrian Bradley - GLAAC President, Moderator
   c. Already on-board: David Levy
   d. Added: Bob Trembley - Vatican Observatory, Dr. Jane Huang - UM
3. More teachers for the Teaching panel
   4. Already on-board: (Bob's Wife)
   a. Added: Paulette Epstein - MSC, Kevin Reina - Ford, S
4. Missing Bios and URLs needed
5. What to broadcast via Facebook and Twitter
   a. Group feels that Bob and Brian have got a good grasp on the what/when/where to announce details and will leave it up to them.
6. Board Meeting
   a. Status of bank accounts
      I. Adrian and John will make an appointment with the bank Adrian has been talking with in Belleville
   b. Financials - expenses
      I. Once bank account is created (probably after AATB in October), submit expenses for reimbursement

Move to adjourn: JW, 2nded by AB; unanimous in-favor.
Meeting Adjourned: 8:51pm

Michigan Dark Sky Update

(Edited from emails from Sally Oey)

Belle Isle, Detroit: On Sept 18, Jerry Hasspacher's group met with MI Dept of Natural Resources administrators about the initiative to name Belle Isle Park an IDA Urban Night Sky Place. Delightfully, they're enthusiastic and supportive! Thanks so much to all who participated. We're especially grateful for collaboration with Detroit Audubon and Scenic Michigan, who can provide some limited FTE toward this effort. The next steps are to identify what needs to be done and develop a proposal for the Belle Isle Park Advisory Committee. Big items are a lighting inventory, and developing a lighting management plan.

Miller-Wagner roundabout, Scio: Dan Del Zoppo et al. met with representatives from Washtenaw County and DTE last week. They are making progress, and one of the fixtures is down to 58 watts from 136 watts. We learned that the manufacturer, Leotek, makes glare-mitigating shields that may be an option as well. Dan is continuing to follow up. Elaine Brock has mobilized a neighborhood group, which is an important factor in gaining attention.

Lutz Park, Livingston County: They are on track for IDA Urban Night Sky Place approval if they can get programming and dark-sky activities in place. **Does anyone have any regular activities they would like to organize there? Or suggest to them?** It's between Ann Arbor, Lansing, and Flint. Please contact the county Planner, Scott Barb, SBarb@livgov.com. It would be fantastic to have another Dark Sky Place in the neighborhood!

Ann Arbor Lighting Ordinance: On Sept 14, the City's Student Advisory Council met and agreed to develop a resolution supporting the A2LO. Many thanks to Gillen Brown for working with their new leadership. As for A2LO itself, the City Planning manager wants to look into options for amortization of existing non-compliant lighting. This will take a few weeks, but if he comes up with something, it will be well worth the wait.

Annie Blackwell, Shari Thompson, and Zayd Mohamud are developing public outreach activities for families and young people, to coordinate with the Ann Arbor Lighting Ordinance effort.

Lonely Planet travel guides published a Dark Skies astrotourism guidebook last year. Does anyone want to check if Michigan is adequately featured in the Aurora Borealis section?

(Continued on page 32)

(Continued from page 31)
Nicholas Poggioli shares that apparently even the darkened **SpaceX satellites** are still a serious threat to astronomy.

Reminder: Please review our Wish List of Action Items. If you can help move forward any items, please add your name and let us know, including adding new items. There's tons to do!

Please enter your name and info on the private Google page Dark Sky Group Members so we can see who we are and how best to leverage what we bring to the effort. Please browse and feel free to use the info in our Google docs, and to add to them.

Thanks again for promoting our Michigan_Dark_Skies!

Meeting Minutes

BOARD MEETING – September 14, 2020

Board Members logged in: All present plus Dale Thieme. Diane Hall called the meeting to order at 6:30

Old Business

Dale Partin reported that presenters have been booked for 2020 but are being accepted for next year.

Riyad Matti visited the observatory on September 12 and reported that it is good shape. However, wasps outside continue to be a problem and must eventually be blocked out.

Jonathan Kade reported that the WASP is up and contains the minutes and treasury report for August. The theme for the next WASP issue will be Mars. A webmaster is needed to continue website improvements and activate the automated membership program! Also, **help** is needed to complete the 2019 Year in Review program & 2020 mailer.

Mark Jakubisin reported that mail pickups from the Post Office have been about 2 weeks apart due to COVID issues. The situation has been gradually improving.

Glenn Wilkins reported that issues related to the "beg" letters are resolved. Mailings to potential donors are expected to be posted the week of 9-21.

Bob Trembley reported that a report has been published regarding the status of the virtual "Astronomy at the Beach" event. A full and exciting program is expected to be in place thanks to the many fine presenters offering their talents. Once this major program is complete, Bob plans to inquire about the Wish List for the New Macomb Discovery Center.

New Business

Star Merge Film – The Board agreed that the best option is the 75-minute version which comes with a speaker. A possible remote meeting was considered but most supported presenting it at a regular meeting in 2021 and adjusting the overall program to allow sufficient time to include questions. The asking price for this purchase will be explored for possible cost reduction.

Insurance renewal – Ken Bertin informed us that our policy is automatically reviewed each year and compared to alternative sources/offerings. The current source is offering a $29 deduction for the same policy which is not affected by the COVID lockdown. Bob did not approve accepting this motion until the review process is complete. The proposed renewal policy has been distributed to WAS members for review. Questions & comments should be directed to Ken.

Paul Strong Scholarship – It was noted that $500 is the minimum amount accepted by the college. The Board voted to continue this memorial program, partly in exchange for the many accommodations that the college provides to the WAS. Riyad opposed this program based on budget concerns.

September Open House – Diane noted that this event conflicts with Astronomy at the Beach. Jonathan proposed that the two events be combined and the Board agreed.

(Continued on page 33)

(Continued from page 32)

Remote elections – Diane read the current by-laws to begin discussions on the feasibility of doing this within existing rules. It was agreed that there is no conflict. Various proposals were explored for feasibility while considering the possible need for secret ballots. The Board will designate a 3-person nominating committee by the next Cranbrook meeting. Most likely, the vote will be done via E-mail to all members.

CRANBROOK VIRTUAL MEETING September 14, 2020

Diane called this meeting to order at 7:31. 30 members continued to participate on Webex and an additional 20 joined on You Tube.

In the News was presented by Tim Campbell. The reports were shortened; however, URL's were provided for those wishing to read the entire articles.

Subjects included:

Evidence of life on Venus – Phosphine has been unexpectedly discovered high in the acidic atmosphere. This is normally produced by living organisms. Alternative sources are being sought.

Intermediate size Black Hole Birth – This is the first known event for the creation of a black hole of 142 solar masses. Discovery was on May 21, 2019, 7 billion light years from earth and was previously considered highly unlikely. The merger of black holes of 66 & 85 S.M. happened in only 0.1 seconds. Improved wave detectors being developed are expected to help better understand these kinds of events in the future.

Life extinction – Evidence suggests that the major event 380 million years ago may have been caused by a supernova which severely depleted our ozone layer from 65 light years away. Other extinction events may also have been caused by supernovae.

Jupiter's moons – Improved detection equipment/techniques now indicate that Jupiter may have captured about 600 moons, each with diameters over 800 meters. Most of these new objects are in retrograde orbits.

Officer/Viewing reports

Diane Hall congratulated everyone who has contributed so much in creating an exceptional program for the GLAAC Astronomy at the Beach virtual gathering this year, especially Adrian Bradley and Bob Trembly.

Dale Partin reported that the October 5 meeting will feature "Little Big Bangs", and a long presentation by David Levy

Jonathan Kade reported that the complete Treasurer's report, and minutes for all the meetings can be found in the current WASP.

Mark Jakubisin reported 90 members and a bank balance of $22,968 at the end of August.

Riyad Matti reported that Stargate remains closed until further notice.

Ken Bertin showed photos reflecting almost no sun activity through all the normal filters.

David Levy showed a dramatic photo of the red sky over San Francisco from the fires.

Jon Blum showed a photo of the extent that some star gazers will go through to get a perfect view through a window.

Break – 8:15 to 8:30

MAIN PRESENTATION

Dr. Dale Partin introduced Jim Shedlowsky and his presentation Searching for the Dark Universe starting with the Greek astronomers and their earth-centered beliefs. He then credited Copernicus and the heliocentric transition before moving into the modern era containing the heart of his presentation. Jim hit most of the key events of the last 100 years and then continued into the amazing last few decades which revealed the existence of dark matter/energy, particle physics, neutron stars, black holes and so much more. Clearly, we live in exciting times for astronomy and physics with the promise of much more to come. Ken Bertin commented that this presentation was among the very best he could remember at the WAS.

The meeting was closed at 9:46

MACOMB VIRTUAL MEETING September 17, 2020

Diane Hall called this meeting to order at 7:29 PM for 18 viewers on You Tube and 18 participants on Webex

IN-THE-NEWS/IN-THE-SKY presented by Jeff MacLeod

News highlights -

Jeff started with a number of surprising statistics regarding what has happened in our solar system since the Cranbrook meeting just last Monday. For instance, 51 meteors were observed, and the earth has moved millions of miles along its orbit.

Phosphine has been confirmed in the atmosphere of Venus, approximately 55 km above the surface (habitable zone). Of course, this has sparked re-

(Continued on page 34)

(Continued from page 33)
newed interest in the planet that was once considered dead.

The historical observatory on Mt. Wilson is apparently unharmed despite the Bobcat brush fire burning only 500 feet away.

Current interesting **objects** in the sky include the Moon/Mercury conjunction and the IO transit of Jupiter coming on 9-22.

OFFICER REPORTS

Diane Hall reported that 3 members are expected to be recruited by the end of this month to identify those who would be interested in running for Board positions and establish the election procedure. Those interested should contact her.

Dale Partin reported on a position report from the Macomb Community College that he received regarding current COVID 19 restrictions which will affect our ability to resume in-person meetings, possibly through 2021. He also noted that Webex meetings have enhanced his ability to schedule high-quality speakers able to provide presentations without having to travel. For instance, Dr. Patricia Straat will explore the prospects of finding Life on Mars for the Macomb meeting on October 15.

Riyad Matti speculated that it may be possible to observe from the observatory area with permission as long as rules are respected.

Glenn Wilkins reported that the Cranbrook minutes are out for Board review, and letters asking for vendor donations for our banquet will start going out on 9-21.

Bob Trembley reported that a link is available for Astronomy at the Beach. The actual itinerary was also distributed to WAS members on 9-17. Teachers have been notified about this event and it will be advertised extensively inviting the general public to participate. Bob also communicated with Dusty Welch at the Discovery Center on 9-17. They are still searching for ways to become active amidst the current limitations.

OBSERVING REPORTS

Dale reported atmospheric smoke has been encountered some nights in the thumb.

Jonathan was able to purchase an 8mm Star Guider eyepiece for only $50. Based on his experiences with 2 other sizes, he expects that this new one will prove to be a good-value purchase also. A former WAS member, Steve Franks, also has given good reviews for these products.

Diane noted the great observing opportunity currently available for Mars. So far during this conjunction it has not been spoiled by dust storms.

BREAK – 8:16 to 8:30

MAIN PRESENTATION

Dr. Dale Partin introduced Dr. Ryan MacDonald, a research associate of Cornell University's Carl Sagan Institute. Dr. MacDonald's talk was entitled "Revealing the Nature of Exoplanet Atmospheres".

The presentation was very informative and included the latest discoveries and research plans. The golden years of exoplanet discoveries began in 1995 when astronomers were able to measure brightness and red shift changes. Major advances came later as follows:

2004 – Ability to identify rocky planets
2007 – Ability to identify "habitable" zones for various star types
2009 – Addition of the new Kepler telescope and ability to detect transits.
2011 – Major jump in exoplanet discoveries
2016 – Planets discovered around Proxima Centauri (our closest star neighbor)
2017 – Discovery of 7 rocky planets in the habitable zone around Trappist 1.
2020 – Discovery of exoplanets around white dwarfs

To date, over 4,200 exoplanets have been cataloged. New techniques now provide improved data during transit and occultation. The coming Webb space telescope should be able to directly observe super Earth's and perhaps even terrestrial-sized rocky plants. The LUVOIR (Large UV Optical Infrared) telescope is expected to be even larger than the Webb. Ariel is currently planned for 2028. An actual visit to Proxima at 20% of light speed may be feasible by 2040 with an electronic report about 4 years later.

Diane closed the meeting at 9:36

Glenn Wilkins
Secretary

The Warren Astronomical Society is a Proud Member of the Great Lakes Association of Astronomy Clubs (GLAAC)

GLAAC is an association of amateur astronomy clubs in Southeastern Michigan who have banded together to provide enjoyable, family-oriented activities that focus on astronomy and space sciences.

GLAAC Club and Society Meeting Times

Club Name & Website	City	Meeting Times
Astronomy Club at Eastern Michigan University	Ypsilanti/EMU	Every Thursday at 7:30PM in 402 Sherzer
Capital Area Astronomy Club	MSU/Abrams Planetarium	First Wednesday of each month 7:30 PM
Farmington Community Stargazers	Farmington Hills	Members: Last Tuesday of the month Public observing: 2nd Tuesday of the month
Ford Amateur Astronomy Club	Dearborn	Fourth Thursday of every month (except November and December) at 7:00 PM
McMath-Hulbert Astronomy Society	Lake Angelus	Board and paid members-First Sunday of the month Public open house—first Saturday at 11 am
Oakland Astronomy Club	Rochester	Second Sunday of every month (except May)
Seven Ponds Astronomy Club	Dryden	Monthly: generally the Saturday closest to new Moon
Sunset Astronomical Society	Bay City/Delta College Planetarium	Second Friday of every month
University Lowbrow Astronomers	Ann Arbor	Third Friday of every month
Warren Astronomical Society	Bloomfield Hills/ Cranbrook & Warren/ MCC	First Monday & third Thursday of every month 7:30 PM

GLAAC Club and Society Newsletters

Warren Astronomical Society: http://www.warrenastro.org/was/newsletter/
Oakland Astronomy Club: http://oaklandastronomy.net/
McMath-Hulbert Astronomy Club http://www.mcmathhulbert.org/solar/newsletter/
Ford Amateur Astronomy Club: http://www.fordastronomyclub.com/starstuff/index.html
Sunset Astronomical Society: http://www.sunsetastronomicalsociety.com/
University Lowbrow Astronomers: http://www.umich.edu/~lowbrows/reflections/

WAS Member Websites

Jon Blum: Astronomy at JonRosie
Bill Beers: Sirius Astro Products
Jeff MacLeod: A Life Of Entropy
Bob Trembley: Balrog's Lair
Bob Trembley: Vatican Observatory Foundation Blog

Doug Bock: https://boonhill.org
Facebook: Northern Cross Observatory https://www.facebook.com/NorthernCrossObservatory
Boon Hill and NCO Discussion https://www.facebook.com/groups/369811479741758
YouTube channel: https://www.youtube.com/channel/UC-gG8v41t39oc-bL0TgPS6w

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

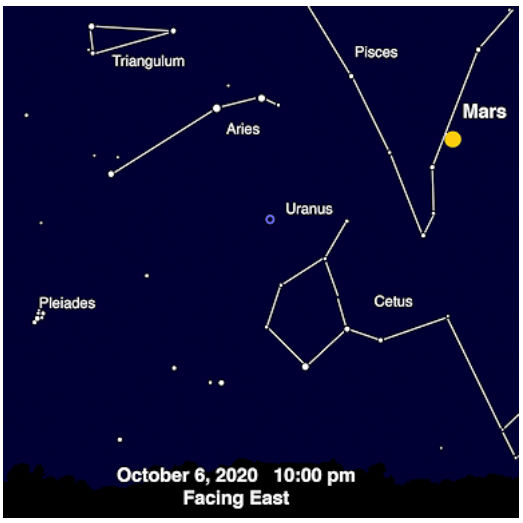
Observe the Skies Near Mars

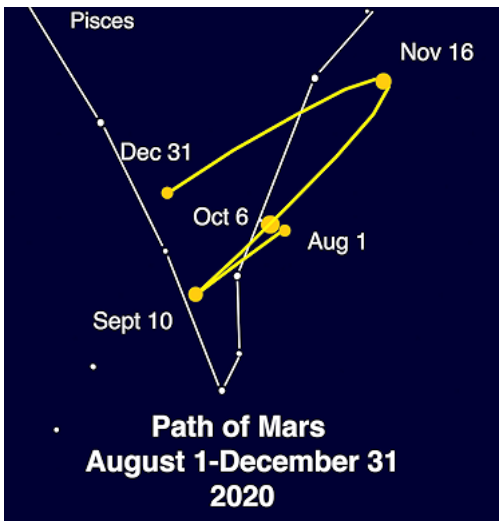
David Prosper

October is a banner month for Mars observers! October 6 marks the day Mars and Earth are at closest approach, a once-every-26-months event. A week later, on October 13, Mars is at opposition and up all night. Mars is very bright this month, and astronomers are eager to image and directly observe details on its disc; however, don't forget to look at the space around the planet, too! By doing so, you can observe the remarkable retrograde motion of Mars and find a few nearby objects that you may otherwise overlook.

Since ancient times, Mars stood out to observers for its dramatic behavior. Usually a noticeable but not overly bright object, its wandering path along the stars showed it to be a planet instead of a fixed star. Every couple of years, this red planet would considerably flare up in brightness, for brief times becoming the brightest planet in the sky before dimming back down. At these times, Mars would also appear to slow down its eastward motion, stop, then reverse and head westward against the stars for a few weeks, before again stopping and resuming its normal eastward movement. This change in the planet's movement is called "apparent retrograde motion." While all of the planets will appear to undergo retrograde motion when observed from Earth, Mars's retrograde appearances may be most dramatic. Mars retrograde motion in 2020 begins on September 10, and ends on November 16. You can observe its motion with your eyes, and it makes for a fun observing project! You can sketch the background stars and plot Mars as you observe it night after night, or set up a photographic series to track this motion. Does the planet move at the same rate night after night, or is it variable? As you observe its motion, note how Mars's brightness changes over time. When does Mars appear at its most brilliant?

NASA has tons of great Mars-related resources! Want to know more about apparent retrograde motion? NASA has an explainer at: bit.ly/marsretromotion. Find great observing tips in JPl's "What's Up?" videos: bit.ly/jplwhatsup. Check out detailed views with NASA's HiRISE satellite, returning stunning closeups of the Martian surface since 2006: hirise.lpl.arizona.edu. NASA's Curiosity Rover will be joined in a few months by the Perseverance Rover, launched in late July to take advantage of the close approach of Mars and Earth, a launch window that opens two years: nasa.gov/perseverance. Calculate the ideal launch window yourself with this handy guide: bit.ly/marslaunchwindow. The Night Sky Network's Exploring Our Solar System handout invites you to chart the positions of the planets in the Solar System, and NSN coordinator Jerelyn Ramirez recently contributed an update featuring Mars opposition! You can download both versions at bit.ly/exploresolarsystem. Young astronomers can find many Mars resources and activities on NASA's Space Place: bit.ly/spaceplacemars. Here's to clear skies and good seeing for Mars's best appearance until 2033!





(left) If you are paying this much attention to Mars, you're likely curious about the skies surrounding it! Find Mars in the constellation Pisces, with constellations Aries, Triangulum, and Cetus nearby. Aries may be the only one of these dimmer patterns readily visible from light-polluted areas. The Pleiades rises shortly after Mars. Dim Uranus is found close by, in Aries. If you are observing Mars up close, use the same eyepiece to check out Uranus's tiny blue-green disc. If you are uncertain whether you spotted Uranus, you didn't see it! Unlike stars, Uranus doesn't resolve to a point at high magnifications.

(right) *The path of Mars during the last five months of 2020. Notice the retrograde motion from September 10 to November 16, with prime Mars observing time found in between. October 6 is the day of closest approach of Earth and Mars, "just" 38.6 million miles apart. Images created with help from Stellarium: stellarium.org*

Last Word

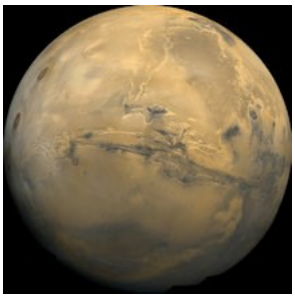
-Jonathan Kade, Publisher

Mars: Planet of Mystery

Once again, we find ourselves at an opposition of Mars. It shines in the sky at almost -3 magnitude, brighter than even Jupiter in the sky. In binoculars, it's a large, bright disk, full of the suggestion of shapes and colors and details just out of reach. In a properly collimated telescope, it is another world, with terrain and frost and surface deposits of minerals that you can easily resolve. And with decent astrophotographic equipment, it is remarkably accessible, again rivaling only Jupiter in size and resolution, as you can see in Jerry Persha's remarkable image earlier in this issue. It's truly a must-see object, and, well, I hope you are doing a better job at keeping up with it than I have been.

Mars has had only seven oppositions since I've had a telescope and known how to use it, and of those oppositions, before this one, only the one in May 2016 really showed off Mars to its fullest extent. At 18 seconds of arc, Mars was big enough to really start to see detail on it. That opposition, I had the improbable honor and privilege of observing Mars using both the Yerkes 40 inch refractor and former W.A.S. president Steven Aggas's wonderful 36" reflector, located in the high desert of Arizona.

The view through the Yerkes refractor was somewhat compromised by a red filter that hid the frost of the southern hemisphere from the casual observer's view; I was seasoned enough to know that everything that was bright red in the eyepiece was actually white. But the dark features showed up as well as you would expect. The 19 other visitors, who were not used to looking through telescopes, did not seem too impressed by our rusty sibling, but every time someone left the eyepiece unused I rushed in to make sure no photons would be wasted.



Apache-Sitgreaves, though, was a truly unsurpassed experience. I had a nearly religious experience at the top of Steven's 18 foot tall ladder, looking down into the bottom of the Valles Marineris. as if I was looking out an airplane window. For twenty precious seconds, the seeing became completely still: the canyon's walls were sharp and steep, the canyon floor subtly textured like dry canyons on earth, the larger rock formations looked like places I've seen in Utah. And then the moment passed - the seeing softened, the ladder began to shake slightly to indicate that I needed to stop hogging the telescope, and I sadly (and quickly) climbed down.

Humans have gazed in wonder at the unpredictable orange wandering star since before recorded history. Think about it in the context of people who don't understand the solar system and the galaxy and the universe. There's this very colorful light in the sky, whose movements not even the wisest Ptolemaic scholars can quite predict, that every third year becomes the fourth brightest light in the sky after the sun, the moon, and Venus (and sometimes Venus is too close to the sun to see), before dimming down to total anonymity among the stars for most of the two year and change cycle. It's a very strange thing to think about!

It's no wonder that Mars attracted something of an unsavory reputation as the planet of war and disaster. Much like the weird periodic variable star Algol and the even more unpredictable and eerie comets, Mars escapes our intuitive understanding as skywatchers. It reminds us that time is passing into a future we cannot see, that the workings of the cosmos are remote and almost unknowable, that human civilization is a small and fragile thing that can be overturned for reasons just as mysterious as the movements of Mars. Then, of course, Percival Lowell's poor grasp of Italian got the better of his imagination, and Mars became a planet of four-armed not-so-jolly green giants, giant spidery space invaders, and of tiny little Spartans with illudium Q-36 space modulators.

But from Mariner and Viking forward to India's new Mangalyaan-2 orbiter and the very appropriately named Mars 2020 Perseverance rover, we've gotten to know Mars a lot better. (Although, as this month's Macomb presenter argues, we may really not know much at all about what Mars is really like.) It seems less like a harbinger of disaster and more like our second home world. As we pick our way through the wreckage of the disaster that 2020 has been and continues to be, perhaps it will be helpful to you and me both to close out the year with some disciplined Mars observing, sketching, and photography. We may never really be able to see into the future, but at least we can get a better understanding of our neighbors here in the current moment.

Image of Valles Marineris courtesy NASA/Hubble