



Celebrating Sixty Years of the Warren Astronomical Society



# The W.A.S.P.

Vol. 53, no. 3

March 2021

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## The Warren Astronomical Society Paper

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### “Dead of Winter?!”

While light pollution is the bane of astronomers, sometimes it can produce some fascinating nightscapes. The light columns we see here are caused by bright lights shining through ice crystals in the atmosphere, looking very much like spirits rising from the dead as Orion and Taurus duke it out over head. Location: Alcona Park, looking WSW over Alcona Dam Pond towards Curtisville, MI. Camera: Sony ILCE-6000, Date/time: 2/12/21 11:56pm EST, exposure time: 20 sec. at f2.5.

Image by Adrian Bradley



# The WASP



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Dale Thieme, Editor

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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:	Third Thursday meeting:
Cranbrook: Institute of Science	Macomb Community College
1221 North Woodward Ave	South campus, Bldg. J, Room J221
Bloomfield Hills, Michigan	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:  
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P.O. Box 1505  
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Pay at the meetings

Also via PayPal (send funds to [treasurer@warrenastro.org](mailto: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.

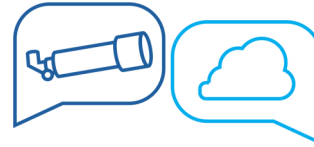
Articles for inclusion in the WASP are strongly encouraged and should be submitted to the editor on or before the end of each month. Any format of submission is accepted. Materials can either be transmitted in person, via US Mail, or by email ([publications@warrenastro.org](mailto:publications@warrenastro.org))

**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.

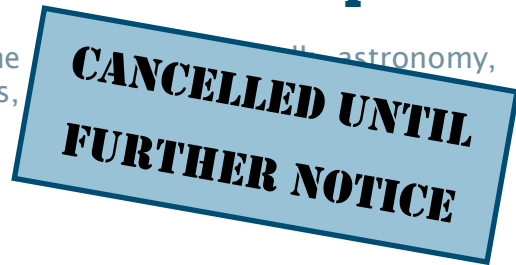
# Snack Volunteer Schedule

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 discuss astronomy, space news,



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## President's Field of View

-Diane Hall

I recently started online classes for a passion of mine that isn't astronomy. As an introductory ice-breaker, the sixty or so members of my cohort shared in turn what they planned to do once pandemic life returned to something resembling the Before Times. I'd initially planned to say that I intended to take a mulligan on last year's dream birthday trip to the Maritimes. It would've been an amazing trip—visiting friends in Nova Scotia, seeing the tides of the Bay of Fundy, soaking in the storybook charm of Prince Edward Island. Ocean spray, marine birds, blue northern twilight, shipwrecks.

All cancelled, of course. Delta wouldn't even pretend to fly us there at that point in the summer. But this year, by the time August rolls around, just maybe...

Yet I remembered how the day before, on a birding hike along the banks of the St. Clair River, our Audubon guide had explained regretfully to us that she couldn't risk letting us look through her spotting scope. I laughed a little in sympathy and mentioned that I understood. And so, when it was my turn to speak, I didn't mention that trip to Canada. Nor did I speak of the other thing I've been craving, which is sitting in a karaoke dive, drinking a cocktail I didn't have to make while cheering on Jonathan's performance and wondering how many

drinks it might take to screw up the courage to sing "Roland the Headless Thompson Gunner" before anyone other than my cat.

I blurted out, "I'm going to be able to set up my telescope when something cool is happening and let complete strangers look through it!"

Now, plenty of my fellows had mentioned travel in general, or Canada specifically, or spoke of dearly-missed friends, or lamented not being able to sit in a lousy bar drinking a sub-par drink. But the telescope thing? That was all mine.

I can't wait.



## Space Pirate Radio

Tune in to Captains Marty Kunz and Diane Hall for live radio

Wednesday nights at 9:00 pm ET  
on



### Club Member Name Tags

Email [publications@warrenastro.org](mailto:publications@warrenastro.org) for your personalized name tag

## 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](mailto: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.





# Letters

## In re: Reports, meeting of 1 Feb., instant.

There was a gentleman, who used a hipster term when describing his astronomical observing. I will not reveal his name to keep shame from his family.

He referred to observing Uranus with binoculars as a "geeky thing". Ten Hail Marys might do wonders for his Soul.

I am old enough to recall when "nerd" and "geek" wormed their way in to general use. They were pejorative. Such frat boy nomenclature was evidence of America's peasant culture, which Charles Murray later referred to as the "proletarianisation" of society. Professor Murray was negatively inspired by an article in SPORTS ILLUSTRATED. I even expended some (undeserved) thought:

The above terms refer to a person cultured, mannered, well turned-out, probably under-stated, studious, intellectually curious, who likely had never watched a Super Bowl and had no intention of starting. At a Cranbrook meeting years ago, the excellent Bob Berta closed his comments by referring to himself as a "nerd". In defense of civilisation I declared: "You are a 'nerd'. I am a scholar".

On an even darker note, now comes Vernon J. Ehlers, Ph.D. and for years my congressman. The Doctorate was in physics. "Become a nerd, or end up working for one". I detect the man had a fraught and under-appreciated youth.

To dismiss nature study under difficult conditions as "geeky" might be interpreted as a sign of insecurity. One might pray apologium is not full-bore character weakness. If one has to diminish one's interest in learned things, one should seek out better company. Welcome to the Warren Astronomical Society.

G. M. ROSS, who never has and never will watch a Super Bowl. And "rap" music? BLECCCCCH!

## ADDENDUM

Dateline: 2 Feb. ~ 11.15 (Eastern)

I was listening to an interview programme on Nat'l Public Radio before it was summarily tuned off. The journalist used "wonky". This dumb fool word (root: wonk) appeared probably in late 1980's. She and other ignorami use it as synonym for analytical or detailed. H. L. Menecken understood a century ago, so not new phenomenon. The infamous Ayn Rand would cite the Dictatorship of the Slob.

Any one know any jokes . . . ?

## Fwd: Removal of Daylight savings time

Forwarded by G.M. Ross

This message is from "Handsome Joe" McBride, Grand Rapids Association, and 4th greatest astro-photographer in Michigan. I am in complete agreement. Never cottoned to D.S.T.

Possibly apocryphal, but Woodrow Wilson called it "golfers' time". More over, Michigan's assignment to the Eastern Zone was a 19th c. function of the same time as the principal financial centre of New York, plus a simplification of rail-road time tables, possibly at behest of the New York Central, possibly the Legislature too. The western Upper Peninsula opted (or bailed) out for good reason.

Our public nights at the Veen are bothered by early summer. When even' twilight ends, I should be in bed. The morning milking comes mighty early . . . . But there is no issue so big I can not straddle it: Have your D.S.T., but the Sunday once removed before Decoration Day, and the Sunday after Labour Day. Enjoy.

----- Original Message -----

Subject: Removal of Daylight savings time  
Date: 2021-02-21 04:32  
From: Joe McBride  
To: Gary Ross

with affect on astro viewing window. I heard this past election period that we need several states to agree on this but if we got rid of daylight savings I can't see nothing but good coming from it astro wise. Starting in mid summer, in the evening when us astro folk start our hobby, the 11:45pm end of twilight will now be at 10:45pm which is much more easy to do...especially for us workin' folks. The end of our observing session will now end at roughly 3:45am which is less that 2hrs after the bars close, and so you can still get a good mornings sleep before starting the mid day. Much more astro events are now in reach of people not able to stay up late. The best part of all is not having to spring ahead every March and make it to work on time for the first week. The worst part is that the car will already be hot when I get in it to work because the sun has been up for 2 hrs.

Sent from my iDork



## About the Cover



Adrian Bradley, our resident Energizer Rabbit, thinks nothing of driving three hours on the chance of some clear skies. Such was the case when he went chasing off to the Lake Huron area's Alcona Park. He missed out on clear skies, but was rewarded with these images. The one below he calls the "Alien Abduction" shot. The Pleiades got a bit abducted, too.



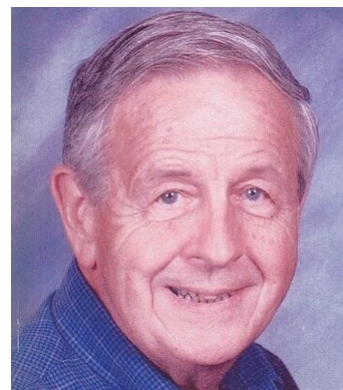
## Saw a Fireball?

Report it to the American Meteor Society!



[www.amsmeteors.org/members/fireball/report-a-fireball](http://www.amsmeteors.org/members/fireball/report-a-fireball)

## *In Memoriam*



**Sidney Keeler**  
**February 2, 2021**

From Bob Berta: Many in the local Astronomy clubs worked with me and Sid Keeler to create the D-A astronomy observatory and put on astronomy Star Parties for Scouts. I first met Sid at a resource meeting for Scouts where I joined other organizations offering our local astronomy clubs services for talks, and demonstrations for scouts. Sid was there representing his Troop and their foundation which is comprised entirely of Scouts with Down Syndrome. He was their scout master for over 50 years. He is the one the idea of an observatory for scouts and he worked to get the funding and help me build the astronomy observatory which is now the best one in any scout facility in the world.

Besides the observatory Sid worked with me and members of all the local astronomy clubs to provide a couple of Astronomy Star Parties for Scouts....many members of the club manned their telescopes and/or gave talks and demonstrations to the scouts.

Besides the observatory, Sid also raised funds and actively built a few facilities at D-A such as the large building housing taxidermy of a variety of Michigan game and fish and gem and astronomy displays. Over the years his foundation also raised a huge amount of money and recruited volunteers for building trails and making them handicap accessible.

To those from the astronomy clubs that helped with the observatory and special Star Parties for scouts....he appreciated your kind support very much. Thousands of boy and girl scouts benefit from the facility and our astronomy club member efforts.

Memorial contributions to the D-BAR-A SCOUT RANCH at <https://michiganscouting.org/donate-friends-of-scouting/> or a charity of your choice are appreciated.



# Observing Reports

## The Sun

### 2 February, morning.

No sun-spots. 60X, 5-cm. refractor with sub-diameter mylar filter.

Transparency excellent, seeing good.

### 3 February, A.M.

No sun-spots. Transparency good, seeing poor.

60X, 5-cm f/ 11 refractor with sub-diameter mylar filter.

### 9 February

No sun-spots. 5-cm. refractor @ 60X

Transparency good, seeing fair.

### 11 February

transparency good, seeing fair. Sun immediately W. of culmination.

No sun-spots.

5-cm. refractor @ 60X. Sub-diameter mylar filter.

### 16 February

No sun-spots.

5-cm. refractor @ 60X. Transparency fair, seeing good.

### 17 February

No sun-spots. Transparency poor, seeing good.

5-cm. refractor @ 55X. Sub-diameter mylar filter.

### 20 February

No sun-spots. Transparency good. Seeing good.

5-cm. f/11 refractor @ 57X, sub-diameter mylar filter.

### 23 February

Two groups, six spots apiece. N. and S. hemispheres.

Transparency excellent, seeing good.

5-cm. refractor @ 57X.

Sub-dia. mylar filter.

### 25 February

1 spot group, 4 spots.

The largest, well developed umbra-penumbra.

Transparency excellent.

Seeing fair (wind)

5-cm. refractor @ 57X

### 26 February

1 group, 7 sun-spots,

largest spot possibly

with bifurcated umbra.

Transparency good, seeing good.

5-cm. refractor @ 57X

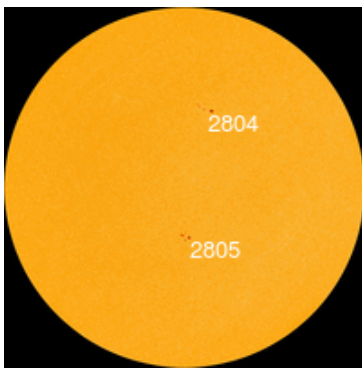
### 27 February

One group of seven spots, one of size. Near W. limb,

so all foreshortened.

5-cm. refractor, as before.

END NOTE: Necessary to shift the instrument ~ 30 metres down the county road to avoid trees. Hence, like observation simple with computer guided telescope for locating the Sun, from a purgatorial back yard in East Detroit, or back yard in purgatorial Farmington Hills.



23-Feb-2021 New sunspots AR2804 and AR2805 are growing rapidly and crackling with [B-class](#) solar flares. Credit: SDO/HMI

## The Moon

### 2-3 February, first light.

Transparency good, seeing fair.

60X, 5-cm. f/11 refractor.

Plato's floor showed no detail, and appeared exceptionally dark. With difficulty and intermittently, the left-right streaks (or brush marks) were visible in Archimedes.

The waning terminator had reached Montes Caucasus. Far to the left of the mountains' promontory, however, stood a point of light in the dark Mere Serenitatis, faint, solitary. From the top of this small mountain the Sun was setting over the Caucasus. It was a minor feature which begged identification.

The North American Aviation photographic lunar halves (early 1960's), derived from the Moore-Chappell 1930's plates at Lick, show a hint of the feature. The scale is very small.

Alter's Plate 29, from the same photographs of larger scale, indicates the mountain. His Plates 121-126 show it well.

Kopal's Plate 185 is an interesting noon-time photograph of the region made at Flagstaff with 61-in. reflector, 1965. The mountain is there, but must be measured off carefully from features in the Montes Caucasus. A left-pointing triangle establishes it -- south UP.

Rukl's Plate 13 is mildly disappointing because the mountain is much subdued. (Not photographic.) What is interesting, and practically beyond a camera, is a large but low dome between the mountain and the Caucasus proper. This dome is a very subtle form likely described by diligent visual observers.

From Lowell Township, below Veen Observatory.

## Fwd: Observing report 2/8/21

From the 4th greatest astro-photographer in Michigan, "Handsome joe" McBride. Western Michigan is well endowed by hard lads. "It's great to live in the Great Lakes country". (From 60 yrs. ago t.v. advert.)

----- Original Message -----

Subject: Observing report 2/8/21

Date: 2021-02-08 04:41

From: Joe McBride

To: Gary Ross

Faint hazy waning crescent 🌙 moon seen through the tinkling snowflakes this AM. Must be in sagittarius ...9F in driveway and zero wind.

Sent from my iDork



# The View From C.W. Sirius Observatory

## Messier 45 -

### The Pleiades Star Cluster

M45, also known as the Seven Sisters, or Subaru as the Japanese called them, is an open star cluster containing middle-aged, hot B-type stars in the north-west of the constellation Taurus. It is among the star clusters nearest to Earth, it is the nearest Messier object to Earth, and is the cluster most obvious to the naked eye in the night sky. The cluster is dominated by hot blue and luminous stars that have formed within the last 100 million years. With 14 hot blue bright stars that can be seen naked eye depending on your observing location. M45 also contains many brown dwarf stars, which is great for astronomers doing brown dwarf studies. Reflection nebulae around the brightest stars were once thought to be left over material from their formation, but are now considered likely to be an unrelated dust cloud in the interstellar medium through which the stars are currently passing. Computer simulations have shown that the Pleiades were probably formed from a compact configuration that resembled the Orion Nebula. Astronomers estimate that the cluster will survive for about another 250 million years, after which it will disperse due to gravitational interactions with its galactic neighborhood. At an average distance of 440 light-years from earth, Messier 45 actually contains around 1000 stars. Again, the blueish nebulosity we see around the stars is believed to be caused from the cluster simply passing through a particularly dusty region of the interstellar medium.

Charles Messier added this M45 cluster to his catalog of comet like objects in 1771. Personally, I am not sure why since this is such a very bright object, which almost certainly cannot be confused with a comet.

The name of the Pleiades comes from Ancient Greek. It probably derives from plein ("to sail") because of the cluster's importance in delimiting the sailing season in the Mediterranean Sea: "the season of navigation began with their heliacal rising"(the time of year when a star first starts to rise above the horizon in the east). In Greek mythology the name was used for the Pleiades, Seven Divine Sisters: Sterope, Merope, Electra, Maia, Taygeta, Celaeno, and Alcyone, along with their parents Atlas and Pleione. The name supposedly derived from that of their mother Pleione and effectively meaning "daughters of Pleione". In reality, the name of the star cluster probably came first, and Pleione was just invented to explain it.

Best observed in the winter months, the Pleiades makes for a very fun observing object whether you are using naked eye, or binoculars or a telescope. It is often said that you can tell the quality of your eyes by counting how many stars you can actually make out. Using a wide field refractor, 110mm or less, and a DSLR camera will produce a very nice photo for your wall. I took this photo years ago at the Great Lakes Star Gaze using a simple Meade DSI one shot color camera through an 80 mm refractor. Happy hunting!



### 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](mailto:BEEZOLL@AOL.COM)





February 2021 has been pretty cloudy, with only two usable nights to date. There was a 3<sup>rd</sup> night that reached a temperature of -14F here, I prefer to not run the system below 0F to protect the hardware, so I skipped that night. But I managed to gather some data the other two nights. All imaging taken through the 10" f/8 RC telescope, using the ZWO asi071mc PRO camera, set at 300 gain and 0C temperature. The mount is the Losmandy G11.

The two dates were February 2-3 and February 20-21, 2021. The last date had a 63% illuminated Moon.

- *NGC 2359* (also known as *Thor's Helmet*) is an emission *nebula* in the constellation Canis Major. The *nebula* is approximately 3,670 parsecs (11.96 thousand light years) away and 30 light-years in size.
- *NGC 2146* is a barred spiral galaxy type SB(s)ab pec in the constellation Camelopardalis. The galaxy was discovered in 1876 by Friedrich August Theodor Winnecke. It has a diameter of 80,000 lyr.
- *NGC 2336* is a spiral galaxy located in the constellation Camelopardalis. It is located at a distance of circa 100 million light years from Earth, which, given its apparent dimensions, means that *NGC 2336* is about 200,000 light years across. It was discovered by Wilhelm Tempel in 1876.
- *Messier 95*, also known as M95 or NGC 3351, is a barred spiral galaxy about 33 million light-years away in the zodiac constellation Leo. It was discovered by Pierre Méchain in 1781, and catalogued by compatriot Charles *Messier* four days later. In 2012 its most recent supernova was discovered.
- *Messier 88* is a spiral galaxy about 50 to 60 million light-years away from Earth in the constellation Coma Berenices. It was discovered by Charles Messier in 1781



-Doug Bock



# Presentations

## Monday, March 1, 2021 Virtual Presentations

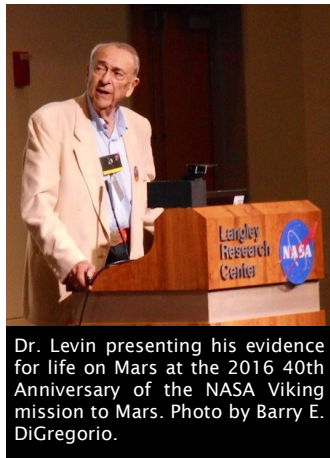
### Main Talk: Is There Life On Mars?

By Dr. Gilbert V. Levin

The direct and circumstantial evidence for life on Mars will be reviewed. Special attention will be paid to the positive results of the Viking Mission Labeled Release (LR) life detection experiments. The reasons for their rejection by NASA will be shown to have been fallacious. NASA now terms the Viking LR results “ambiguous,” but has refused for the intervening 45 years to send another life detection experiment to Mars to validate or refute whether we Earthlings are alone. However, it says that mystery is one of the paramount scientific problems. The improbability of a sterile Mars is explained, as is the difficulty for Perseverance to avoid finding extant life, even though it has no “life detection experiment.”

### About Dr. Levin:

In 1967 Levin founded Biospherics Research Inc. (now Spherix Inc.), where he was CEO and President until 2003, and served as Chairman of the Board until 2007. His innovative approaches to detecting microbial life led NASA to award him a series of contracts to develop methods for the detection of extraterrestrial life in spacecraft missions. Dr. Levin was appointed by NASA to a committee to recommend experiments for the Biosatellite Mission. NASA also asked him to serve on its Planetary Quarantine Advisory Panel.



Dr. Levin presenting his evidence for life on Mars at the 2016 40th Anniversary of the NASA Viking mission to Mars. Photo by Barry E. DiGregorio.

### Short Talk: The Case against Mars

By G.M. Ross

With the exception of Brobdingnagian investments in manned space exploration, Mars has captured the attention and funding of American projects. All be it commendable, this policy should end.

*(Continued on page 10)*

## Thursday, March 18, 2021 Virtual Presentation

### Basic Orbital Mechanics

By Bob Trembley

In this presentation, Bob Trembley shows you how orbits work, and how spacecraft navigate in a rotational frame of reference. Bob will visually demonstrate how spacecraft get into Earth orbit, show you how orbits are raised and lowered, perform an orbital rendezvous and docking, perform a transfer orbit to the Moon, and go into orbit of the Moon.

Bob will be using the amazing space simulator app Kerbal Space Program to demonstrate these orbital maneuvers; Bob has logged over 4100 hours running this simulator, and believes its educational potential is astounding. Over the last few years, both NASA and the ESA have partnered with KSP, and added real-life spacecraft and missions to the simulator. Bob says that KSP has ruined several science fiction movies for him because they got their orbital mechanics completely wrong.

Bob is fantastically interested in asteroids, near-Earth objects (NEOs), and meteorites. Bob is a HUGE fan of educational space-related PC software such as: NASA's Eyes on the Solar System, Universe Sandbox, SpaceEngine and Kerbal Space Program. Bob and his wife Constance, a middle-school science teacher and also a Solar System Ambassador, run an after-school astronomy and space science club at Connie's school called the "Endeavour Space Academy."



(Continued from page 9)

The Speaker will briefly review the missions by the United States and others in the 1960's and '70's for historical context. There will be no mention the periodic debate of the 1980's, *infra*, about manned versus exploration by automata. The immense possibilities of other Solar System projects -- even interstellar -- will be enumerated. Outer space is no longer a bipolar adventure. It is hoped optimistically that a balance can be restored, especially given the financial constraints of the present day and near future.

Dedication: In memory of Jeff Dickerman, once the star of our firmament.

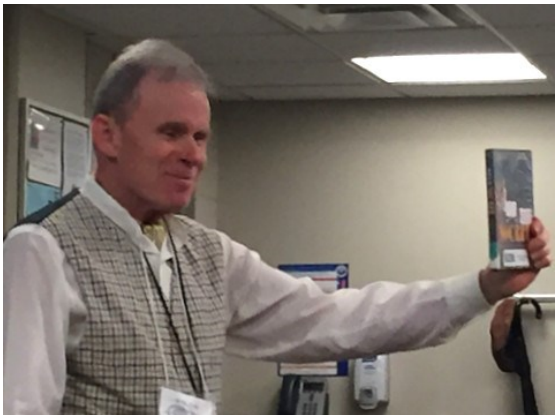
### About G.M. Ross

First lunar observations in 1958 with Dad's French binoculars @ 8X, dropped in a row-boat a few years later, but not repaired for over fifty years by the Wizard of Mount Hukee.

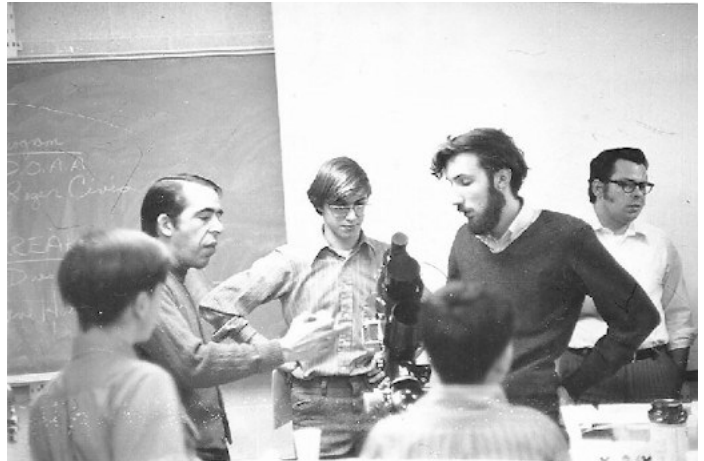
Fired for incompetence from Wayne-Oakland Science Olympiad.

Not worn gym shoes since the Kennedy administration, owned any "camo" since the first Bush administration, have never sent nor received a text message, do not and never have owned a black pick-up truck -- with no intention of starting.

Can not find *Camelopardalis* nor *Lynx*, but should get cracking.



## Photo Success!



In our February issue, a photo from the Pete Kwentus collection was posted in hopes of identifying the members in the shot. Jonathan Kade, Gerald Persha and Mark Kalinowski (who remarked he'd recognize his Dad's sideburns anywhere) responded and the identifications made. From left to right, not counting the backs of heads, is Roger Civic, Gary Morin, Gerald Persha, and Larry Kalinowski.

Much appreciation from the history SIG.

### Now, let's give this a try:



As always, send your answers to:  
[publications@warrenastro.org](mailto:publications@warrenastro.org)

## 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](mailto:firstvp@warrenastro.org).





## Stars are people too.

In last month's Skyward, I included that four-word phrase, but the first time I used it was actually in an article about the life of the star Betelgeuse, for Astronomy magazine. When I met Richard Berry, the editor at the time, he began by reciting those words: "Stars are people too." He added that he accepted the article for publication in his magazine after he read those words. (It turns out that wasn't my only unusual experience with that magazine. A few years later David Eicher, the current editor, and I witnessed a construction crew blowing up a freeway overpass near the magazine's headquarters in Milwaukee.)

As I explained last month, stars live out their lives much as do. They are born in gaseous stellar nurseries, or diffuse nebulae. In our sky two of the most famous nebulae appear are in summer, the Lagoon Nebula in Sagittarius, and in winter, the Orion Nebula. The little stars within the nebula vary in

brightness, usually by a few tenths of a magnitude, but they can change quite quickly. There are a few others in the Hyades star cluster in Taurus, the bull. I saw one star there change rapidly over a period of a few minutes. These stars mimic the behavior and misbehavior of human youth.

Also like us, stars settle down as they grow older. Our Sun is an example of a star in middle age. It has shone steadily for almost five billion years and will continue this way for another several billion. Except for a cycle of eleven years during which the numbers of sunspots, which are storms on the face of the Sun, rise and fall, the Sun behaves constantly and predictably. There are vague hints of a 12,000-year cycle dating back to biblical times, but I have not found any evidence for this.

As our Sun enters old age it will begin to act erratically again. Its hydrogen supply will be almost exhausted. It will begin to fuse its helium. At some point during its red giant phase, it will suffer a helium flash. This event might feature only a few

minutes of strong helium fusion, but during which the Sun briefly will emit an enormous amount of energy equivalent to that of our whole galaxy. As it continues its red giant phase it might vary in brightness by several magnitudes over many months. Mira, a star in Cetus the whale, is such a star. A Mira star's core begins to contract under the force of its own gravity and whatever hydrogen is left will ignite into a shell around the core. Mira, like other red giants, was once a Sun-like star that has used up its supply of hydrogen. Once the helium is exhausted, its core will be left with heavier elements like oxygen and carbon. The outer layers of these old stars will explode as novae every few hundreds or thousands of years. Eventually, with their outer layers gone, the core will become a white dwarf star.

If a star is much more massive than our Sun, it would end its life far more dramatically—as a supernova. Such an event is really catastrophic. There are two kinds. In the first, the small-

*(Continued on page 12)*



This picture is a shot of Orion rising in the east. Below the three stars of the belt is the fuzzy Orion Nebula, a stellar nursery where stars are born and young stars might flicker. The bright star on the left is Betelgeuse, a very old star that might become a supernova in the distant future. Photograph by David H. Levy in 2005.



(Continued from page 11)

er member of a two-star system will keep on attracting material from its larger companion. But instead of repeated nova explosions, the small star will get more and more massive. When that star's core reaches a certain limit, in less than a second, the star finally will collapse on itself and will blow itself apart.

The other kind involves a very massive star, say three or four times the mass of the Sun. Just like in the smaller star, its supply of hydrogen will be gone. With little helium left the still contracting core is left with carbon and oxygen. When the core reaches a certain temperature, the remaining carbon will ignite all at once tear the star apart.

If the star is very massive, say nine or ten times the mass of the Sun, its very hot core allows the carbon to ignite and burn as before, but gradually, not all at once. Heavier elements like phosphorus and sulfur will be formed in shorter and shorter intervals, until silicon is generated. After just one day, the silicon will fuse into iron. Iron cannot fuse to anything heavier. Instead, in less than a second the core will crash in on itself. In the resulting explosion, the star's outer layers will be blown away. The brightness rise is so dramatic that the single supernova will outshine its entire galaxy. What is left is either a very dense neutron star, where a cubic inch of matter would weigh as ton or more here on Earth, or in the most massive stars, a black hole from which even light cannot escape.

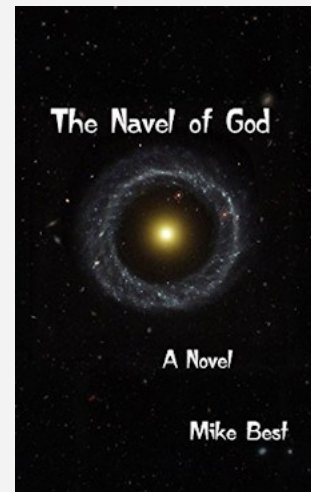
Although stars do not have consciousness like we do, they lead extraordinary lives that are well worth our appreciation and study. Don't forget: Stars are people too.

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## The Navel of God by Mike Best

This is not just another science fiction story. It offers action, suspense, mystery and romance. The Detroit News book editor, Andrea Wojack, awarded it 5 out of 5 stars.

"In the case of Zack Peters, PhD Physics, things couldn't get much better. A former CIA agent and currently science advisor to the American President, he enjoys all the perks that come with the job as well as a reputation of being one of Washington's most eligible bachelors.

Peters has had more than his share of adventures, friends and many of less-than-successful love affairs. His greatest adventure will begin when he discovers that some people are not who they appear to be as he finds himself the focal point of Earth's first contact with extraterrestrials."

The 419-page, 6x9-inch, paperback, draws on the author's 42-year background in astronomy. He has given more than 950 lectures, hosted 14 cable-television shows and is a frequent radio guest in the U.S. and Canada - all to an estimated audience of 80,000.

*The Navel of God* is the author's answer to a question posed by the late astronomer Carl Sagan's both his book and television series *Cosmos*. "How would a dispassionate observer view our stewardship to the Earth?"

For a personalized copy, send a \$19.99 check made to Mike Best, 38513 Chestnut Lane, Westland, MI 48185. No additional charges for tax, handling or mailing.

Unsigned copies are available from Amazon  
[www.amazon.com/Navel-God-Novel-Mike-Best](http://www.amazon.com/Navel-God-Novel-Mike-Best)

# As Far as the Eye Can See

Brad Young

Astronomy Club of Tulsa

Twice a year, near the equinoxes in spring and fall, there is a short period of time when the geostationary satellites are visible in small telescopes, binoculars, and even naked eye. You need to know when and where to look; it takes a little preparation and effort. The reward is seeing the most distant man-made objects out there visible to us.

First a little information about the satellites themselves. Geostationary satellites are so named because they have been placed in an orbit that keeps them over one spot on earth all the time. Because of this placement, these satellites are often used for TV or communication transfer and linkages (e.g. Dish Network). The satellites are placed as close to over the equator as possible and at the desired longitude for the market.

Around the equinoxes, the sun is moving in the sky from one side of the equator on the earth to the other. This means that for a few nights, the alignment of geostationary satellites, which have large solar panels for power, reflect the sun back to an observer on Earth. Because a geostationary satellite is, well, stationary relative to the observer, it may flare for up to 10 minutes or more. The flares can be as bright as magnitude 2. Most flares are in the magnitude 6 to 11 range, so they are better seen in binoculars or a small telescope.

There are many resources on the internet that explain further what the satellites are, how they are designed, details on the orbits and other topics that you may want to explore further. But for the purposes of this article, I would like to focus on trying to see a few of these in spring and fall, using simple methods and a few pointers on when and where to look for each season.

When I first began looking for flaring geostationary satellites, I read all kinds of articles and spent many nights staring right at the spot in the sky where I thought they would be. I was looking in the center of the shadow of the Earth projected into space, which, it turns out, is the only place you can be *absolutely certain* you will *never* see one.

What I needed was a practical guide to help me, and when I found one, it was both easy and fun. Watching a single “bird” appear to glide through a field of stars, or a group of up to five move along in formation is one of my favorite astronomical activities. And, if you need to take a break, even with no drive on your scope, feel free. When you come back, the satellite will still be there (unless it went into the Earth shadow). After all, its stationary.

## Finding the Coordinates

To find the targets, we will need the following coordinates:

1. Declination of travel (DOT) - constant for your location
2. Date of best alignment (DOBA) - constant for your location
3. Location of Earth’s shadow (LES) - moves 1° east each day
4. Date

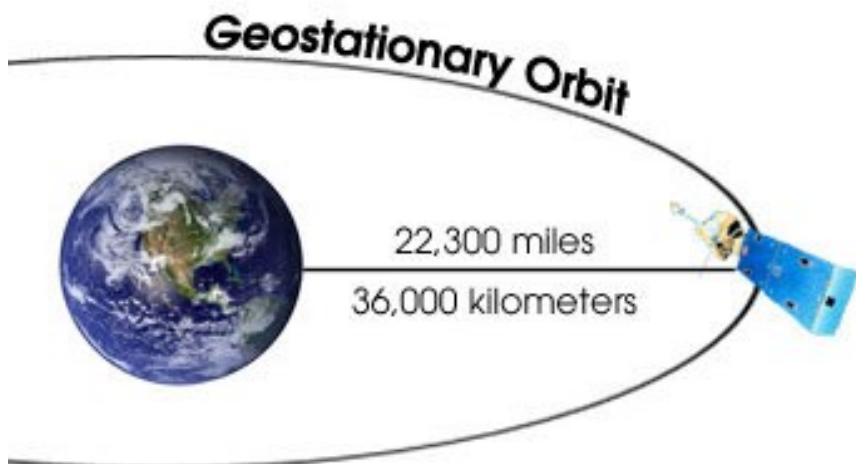
## Declination of Travel (DOT)

The declination of travel (DOT) is a line in the sky along which all the geostationary satellites will appear to travel as seen from your location. The DOT along which the satellites appear can be calculated easily using trigonometry. For convenience, refer to Table 1 and the end of this article for the DOT for several cities in the world. You can interpolate for other locations. The DOT is the same for both spring and autumn.

## Date of Best Alignment (DOBA)

Another coordinate that is constant is the date of predicted brightest flares. This day is found by determining the date sun reaches the declination line of travel for your site. This angle maximizes solar panel reflection back to you on the surface of the Earth at night. I also list on Table 1 the typical DOBA for each season. Remember that flaring may occur for several days before and after DOBA.

(Continued on page 14)



(Continued from page 13)

### Location of Earth's shadow (LES)

The next coordinate does change every night. The LES lies along the DOT and guides us to where we will have the best chance of a bright flare from the satellite. As the satellites get closer to lining up to reflect the sun back at you on the ground, they also get closer to being blocked from the sun by the Earth. So, the point along the DOT to see a flare is 20-30 minutes before the satellite enters the shadow of the Earth (shadow *ingress*), and then again (up to 30 minutes), when it emerges (*egress*). There is about 60 minutes between the two best times to look – this is the time it takes for the satellite to “move” across the width of Earth’s shadow in the sky.

I have included Table 2 (for March / April) with suggested search areas based on the location of the Earth’s shadow for the period of interest. The shadow location is simply 180° from the sun. Since the shadow is about 15° wide, you will want to look at least 10° to 20° west of the center of the shadow for flares before shadow ingress and the same distance east for flares after shadow egress. The Right Ascension (RA) is the same for all locations, only the declination changes, based on the DOT, so you can interpolate if necessary. You can also interpolate before and after the table range, using a change in sweep range positions of about 4m of RA every day.

Typically, flares are brighter before ingress in the evening before local midnight. The flares after egress are often the brighter ones after local mid-

night. Remember that local midnight is actually 1:00 a.m. during Daylight Saving Time.

### Date

Our final coordinate is the date, and it leads to where in the sky to look for flaring geostationary satellites. Sweep your eye or scope along the DOT as shown on Table 1, along the range of Right Ascension given by Table 2. As an example:

**Location** = Detroit

**Date** = March 4

**DOT** (from Table 1) = -6.4 deg

**From Table 2:**

Sweep range before shadow ingress = 9h 49m to 10h 25m along -6.4° declination

Sweep range after shadow egress = 11h 33m to 12h 9m along -6.4° declination

You may find a star that seems to be moving with respect to the other stars in the field. Note that this movement may be quite slow especially with binoculars or naked eye. The speed at which the satellite appears to go along the DOT is 1° (two full moon widths) every 4 minutes. (Because this is the speed at which Earth rotates about its axis). If you are using a telescope at 50 power, this motion will appear to be 50 times faster. That will probably be noticeable, especially if the satellite passes by a group of stars. It may be more difficult to notice the movement with binoculars or eyes alone.

(Continued on page 15)

TABLE 1						
Site Specific Data						
Location		Lat	Long	DOT	DOBA 1	DOBA 2
Edinburgh	UK	56	-3	-7.6 deg	1-Mar	13-Oct
Detroit	USA	42	-83	-6.4 deg	4-Mar	10-Oct
Tulsa	USA	36	-96	-5.6 deg	6-Mar	8-Oct
Vadodara	India	22	73	-3.6 deg	11-Mar	3-Oct
Singapore		1	104	0.0 deg	18-Mar	24-Sep
Cairns	AUS	-17	146	2.9 deg	28-Mar	16-Sep
Cape Town	SA	-34	19	5.3 deg	3-Apr	10-Sep
Punta Arenas	Chile	-53	-71	7.6 deg	9-Apr	4-Sep

DOT is Declination of Travel

DOBA is Date of Best Alignment

DOBA 1 is for Northern Spring / Southern Fall

DOBA 2 is for Northern Fall / Southern Spring



*(Continued from page 14)*

My advice at least for your first attempt would be to go ahead and sweep along the DOT with a telescope at least 50 power. Keep in mind that if you increase the power too much - say 150x or above - the field of view may be too small, and you may not be at the position you need. Even small telescopes will pick up some flares, and the objects are easier to notice with the effect of magnification.

Instead of trying to predict and find targets that may be flaring, I have found more success sweeping along the DOT, checking on star groups or asterisms along the way. As a flaring satellite appears to move past a group of stars, you can record the time and identify which satellite it was later. The Right Ascension is given by the stars you see the satellite pass, and the declination is always the DOT.

Remember also that these are suggested ranges; there may be flares beyond the suggested sweep range, or even slightly different than the DOT.

### Naked Eye Observations

Although it can be more difficult to notice the satellite “moving” using just your eyes, here are some helpful hints. If you see a star along the DOT that was not there before, and isn’t on star charts, it is probably a flaring satellite. For instance, in spring, my sweep area in Tulsa (before shadow ingress) crosses Sextans, a dim constellation. If there are any stars that can be seen without optical aid between Regulus and Alphard, it’s worth checking on as a target. Also, it is probably a satellite if the “star” brightens and then disappears (ingress) or appears quickly and slowly dims (egress).

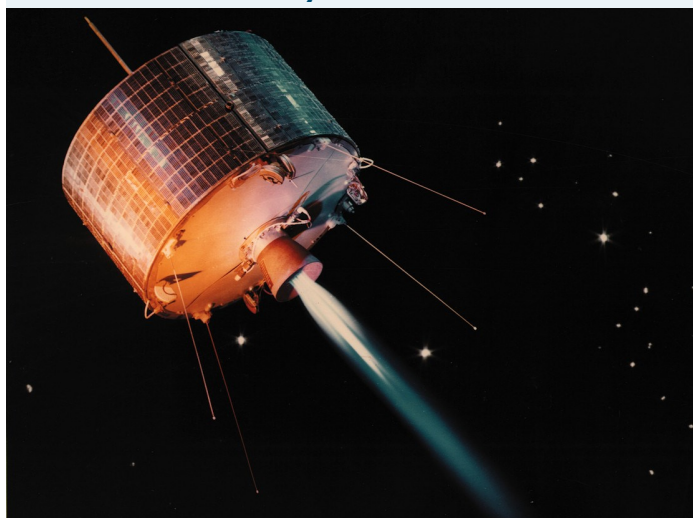
### Imaging Flaring Geostationary Satellites

Another article could be written about imaging these objects. In fact, there are several on the web. Long exposures and very wide fields will show the “string of pearls” effect as the satellites brighten and fade along the DOT over several hours. The basic principles for locating and identifying are the same, and great images can be had with a wide-angle setup, preparation, and a little effort.

### Finder Charts

I have attached to this article two star charts that may help in your attempt to find these fascinating objects. I have included charts for spring (autumn in Southern Hemisphere) and will develop charts and tables for September-October before then and reissue this article. There are several star groups and asterisms along the DOTs, and I’ve found it useful to sweep among them when observing, to see if anything seems to “fly” through the field.

## The First Geosynchronous Satellite



NASA began development of new communication satellites in 1960, based on the hypothesis that geosynchronous satellites, which orbit Earth 22,300 miles (35,900 km) above the ground, offered the best location because the high orbit allowed the satellites' orbital speed to match the rotation speed of Earth and therefore remain essentially stable over the same spot. Only 17 months after development began, NASA launched Syncom I, but it stopped sending signals a few seconds before it reached its final orbit. Five months later, NASA launched Syncom II, which demonstrated the viability of the system. The next Syncom transmitted live coverage of the 1964 Olympic games in Tokyo to stations in North America and Europe.

*Image Credit: NASA*

### Other Tips

The Moon can be detrimental to your chances of observing geostationary satellites flaring up. Of course, the fuller the moon, the brighter the sky, with the problem that around the equinoxes a full moon will be both opposite the sun and near the equator where the satellites appear. Luckily, in both spring and fall 2021, the moon is out of the way (in temperate zones).

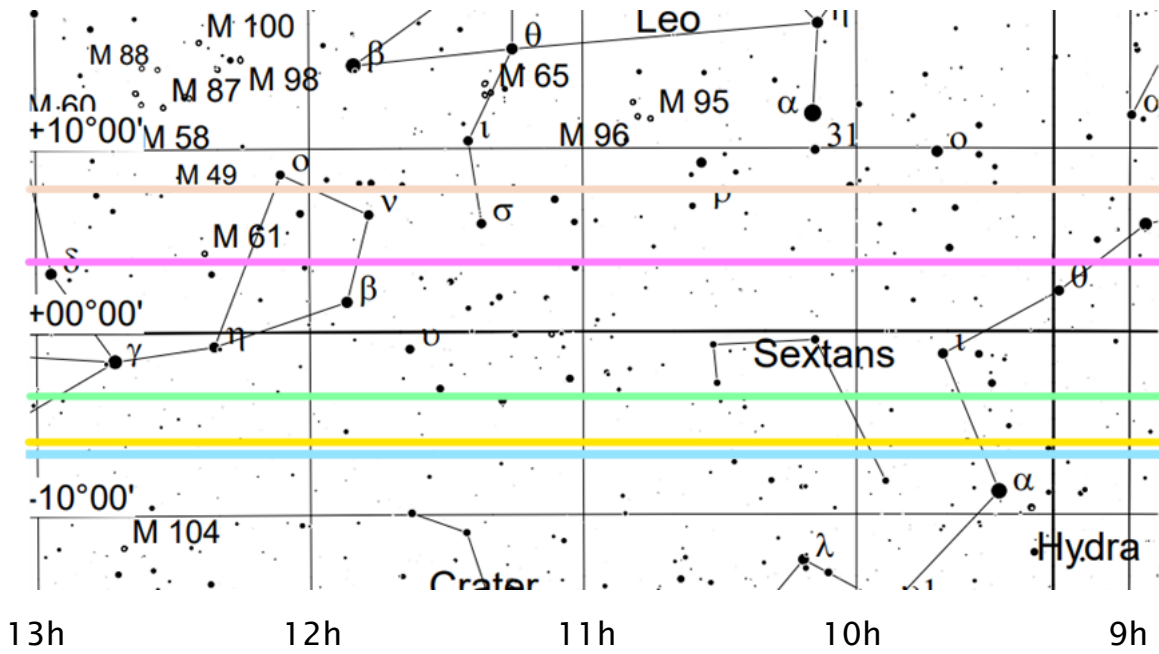
Even if you can't make it or observe on the exact DOBA for your site, any night 4-5 days before or after the best date will still have good chances for some flaring.

These instructions have been generic, as I often find search and observation methods are best approached with guidance rather than procedure. If you have any questions, feel free to contact me at [allenb\\_young@yahoo.com](mailto:allenb_young@yahoo.com)

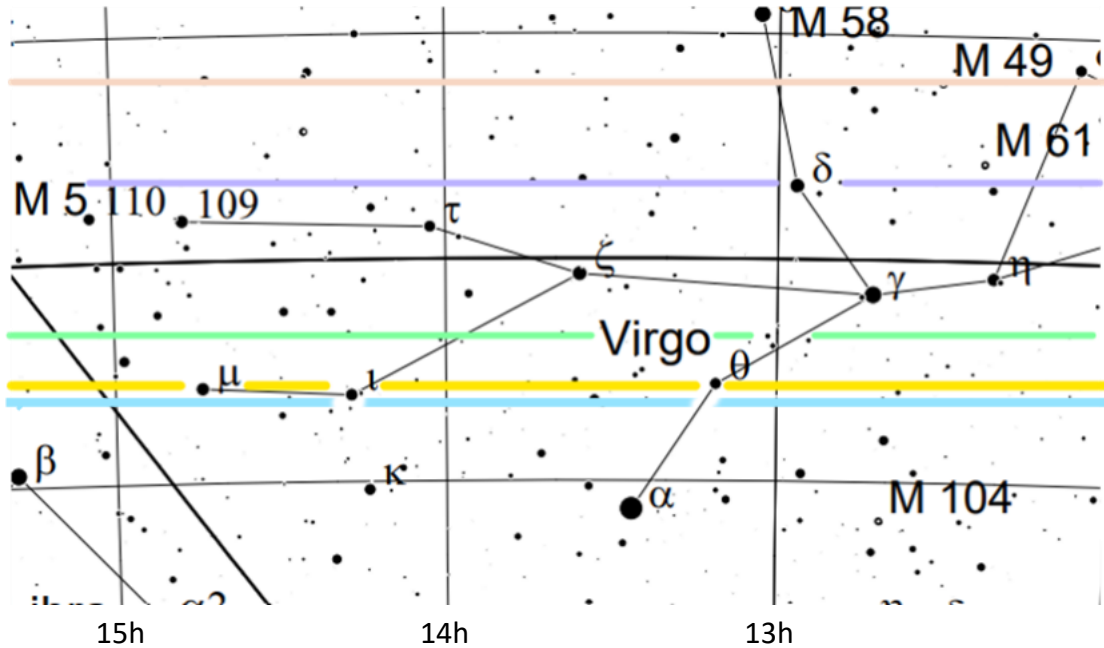
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### STAR CHART FOR MARCH / APRIL INGRESS (ENTERING SHADOW)



### STAR CHART FOR MARCH / APRIL EGRESS (EXITING SHADOW)



DOT KEY:

- BLUE = DETROIT
- GOLD = TULSA
- GREEN = VADODARA
- PURPLE = CAIRNS
- PEACH = PUNTA ARENAS

(Continued on page 17)

(Continued from page 16)

## TABLE 2

### Northern Spring / Southern Fall

Date	Ingress		Egress	
	From	To	From	To
1-Mar	9 h 37 m	10 h 13 m	11 h 21 m	11 h 57 m
2-Mar	9 h 41 m	10 h 17 m	11 h 25 m	12 h 1 m
3-Mar	9 h 45 m	10 h 21 m	11 h 29 m	12 h 5 m
4-Mar	9 h 49 m	10 h 25 m	11 h 33 m	12 h 9 m
5-Mar	9 h 52 m	10 h 28 m	11 h 36 m	12 h 12 m
6-Mar	9 h 56 m	10 h 32 m	11 h 40 m	12 h 16 m
7-Mar	9 h 60 m	10 h 36 m	11 h 44 m	12 h 20 m
8-Mar	10 h 3 m 00 s	10 h 39 m	11 h 47 m	12 h 23 m
9-Mar	10 h 7 m	10 h 43 m	11 h 51 m	12 h 27 m
10-Mar	10 h 11 m	10 h 47 m	11 h 55 m	12 h 31 m
11-Mar	10 h 14 m	10 h 50 m	11 h 59 m	12 h 34 m
12-Mar	10 h 18 m	10 h 54 m	12 h 2 m	12 h 38 m
13-Mar	10 h 22 m	10 h 58 m	12 h 6 m	12 h 42 m
14-Mar	10 h 26 m	11 h 2 m	12 h 10 m	12 h 46 m
15-Mar	10 h 29 m	11 h 5 m	12 h 13 m	12 h 49 m
16-Mar	10 h 33 m	11 h 9 m	12 h 17 m	12 h 53 m
17-Mar	10 h 37 m	11 h 13 m	12 h 21 m	12 h 57 m
18-Mar	10 h 40 m	11 h 16 m	12 h 24 m	13 h 0 m
19-Mar	10 h 44 m	11 h 20 m	12 h 28 m	13 h 4 m
20-Mar	10 h 47 m	11 h 23 m	12 h 31 m	13 h 7 m
21-Mar	10 h 51 m	11 h 27 m	12 h 35 m	13 h 11 m
22-Mar	10 h 55 m	11 h 31 m	12 h 39 m	13 h 15 m
23-Mar	10 h 58 m	11 h 34 m	12 h 42 m	13 h 18 m
24-Mar	11 h 2 m	11 h 38 m	12 h 46 m	13 h 22 m
25-Mar	11 h 6 m	11 h 42 m	12 h 50 m	13 h 26 m
26-Mar	11 h 9 m	11 h 45 m	12 h 53 m	13 h 29 m
27-Mar	11 h 13 m	11 h 49 m	12 h 57 m	13 h 33 m
28-Mar	11 h 17 m	11 h 53 m	13 h 1 m	13 h 37 m
29-Mar	11 h 20 m	11 h 56 m	13 h 4 m	13 h 40 m
30-Mar	11 h 24 m	11 h 60 m	13 h 8 m	13 h 44 m
31-Mar	11 h 28 m	12 h 4 m	13 h 12 m	13 h 48 m
1-Apr	11 h 31 m	12 h 7 m	13 h 15 m	13 h 51 m
2-Apr	11 h 35 m	12 h 11 m	13 h 19 m	13 h 55 m
3-Apr	11 h 38 m	12 h 14 m	13 h 22 m	13 h 58 m
4-Apr	11 h 42 m	12 h 18 m	13 h 26 m	14 h 2 m
5-Apr	11 h 46 m	12 h 22 m	13 h 30 m	14 h 6 m
6-Apr	11 h 49 m	12 h 25 m	13 h 33 m	14 h 9 m
7-Apr	11 h 53 m	12 h 29 m	13 h 37 m	14 h 13 m
8-Apr	11 h 57 m	12 h 33 m	13 h 41 m	14 h 17 m
9-Apr	12 h 0 m	12 h 36 m	13 h 44 m	14 h 20 m





## Astronaut Wives Club

<https://abc.com/shows/the-astronaut-wives-club>

### Episode Six: In the Blind

It's been eight months since JFK was shot and Annie (Azure Parsons) and Rene (Yvonne Strahovski) are supporting John Glenn's bid for the Senate. Annie's stutter has improved enough she can introduce Rene for a stump speech and Rene is relishing the political spotlight. Back in Houston, Louise Shepard (Dominique McElligott) is anticipating Al's career trajectory as the commander of Gemini 1 and then Apollo 1. And poor Betty (JoAnna Garcia Swisher) starts getting threatening letters from an admirer of Gus mixed in with the fanmail.

Times are a' changing. Scotty Carpenter chooses "singing to starfish" with SeaLab over the moonshot. We get a new character, Ed Dwight (Ray Fisher), and if you're wondering why you haven't heard of any astronaut hero named Ed Dwight there's a reason for that. This episode brings a new Astrowife, fragile Pat White (Alexa Havens), into the fold as a tentative replacement for Annie... but the real draw is Pat's handsome man Ed, who just might have the charisma to fill the "Glenn Hole" left by John's departure. Once again, sisterhood is forever, unless your fake friends are coming over to mooch off your AC or just want to ogle your husband.

Anyway, let's talk about Captain Ed Dwight. He's Black. He gets called in to speak to Gus Grissom

(Joel Johnstone), who wants him to mentor a boy named Xavier (Akili McDowell), whose mother works in housekeeping down at the Cape. I'd suspected that Xavier might be an astronaut's secret kid when he turned up a few episodes back. Possibly Gus's kid. In this he's being used as a barometer of the times; once he idolized Captain Dwight but now—after watching his hero get passed over in favor of all the white rocket jockeys— he's more interested in what's going on in the streets than he is in reaching for the stars.



The episode brings the drama— medical drama and marital drama, interjected with an attempt to address the decades-old dilemma between spending money to send men into space and using that money to fix our problems here on Planet Earth. Does it work? I don't know; utilizing Ed Dwight for one episode in such a half-baked way feels insulting, but erasing him from the narrative isn't really a better alternative than trying to acknowledge the iniquities of the space program. "In The Blind" is all about transitions, mostly uncomfortable ones, and acknowledg-

ing that discomfort is admirable. But it doesn't entirely work.

But hey, we get to see Al Shepard beat up by disgruntled workingmen, so I give this...

Four moons out of five. Also, bottoms up, because the show is starting to really acknowledge everyone drinks way too much.





## Rheita Trench

The area on either side of the crater Metius (90km diameter) seen near center in this image, is complex and fascinating. To the right is the obvious Vallis Rheita, formed when ejecta from the Mare Nectaris impact created a line of over a dozen craters. The crater Rheita (71km) itself



To the immediate left of Metius is a slightly smaller crater Fabricius (80km) known for the odd ridge of mountains on the its floor to one side of the central peak, the tops of which are just catching the early morning sunlight here. This ridge may be the remnants of an ancient crater wall that was destroyed by later impacts but this is speculation. The walls of Fabricius have slumped to a large degree, onto the

Janssen to Vallis Rheita  
2021 01 18 0145UT  
Colong=324.8°  
TEC 8" f/20 Mak-Cass  
Cam: SKYRIS 132M  
Filter: 665nm  
Seeing: 8-9/10  
North Up

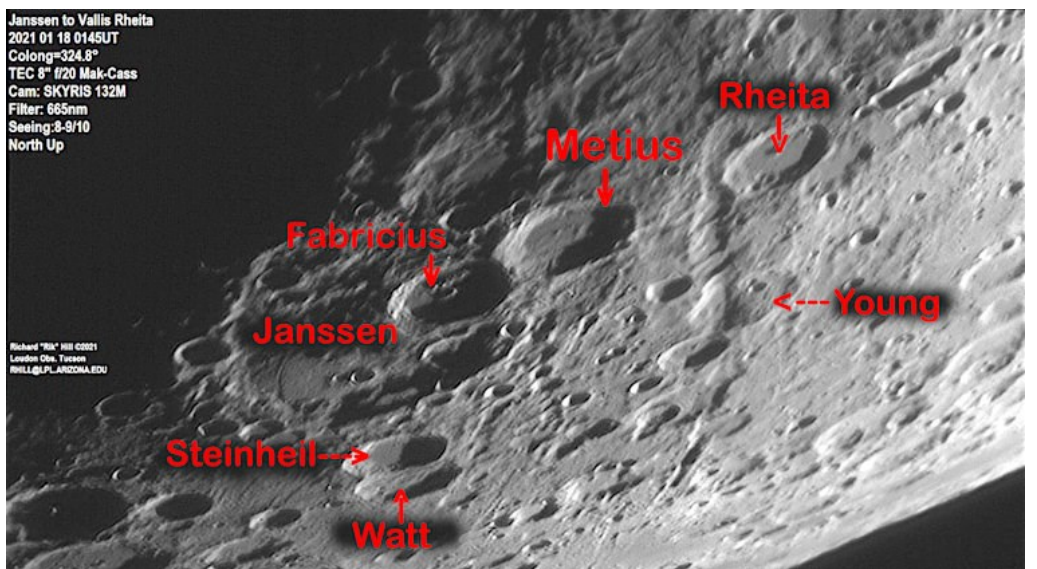
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Loudon Obs, Tucson  
RHILL@LPLARIZONA.EDU



can be seen at the top of this line in the image with its little central peak. Some lunar researchers see Vallis Rheita as two separate but overlapping troughs as evidenced by the bend in the middle with the farther portion coming from the impact of Nectaris that it points back to, while the western portion (nearer the terminator) points south of the Mare on a line with Fracastorius and Theophilus. Before we move on, notice the odd crater to the right of Rheita, Rheita E, obviously formed from 4 or 5 craters being merged.

Janssen to Vallis Rheita  
2021 01 18 0145UT  
Colong=324.8°  
TEC 8" f/20 Mak-Cass  
Cam: SKYRIS 132M  
Filter: 665nm  
Seeing: 8-9/10  
North Up

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(Continued on page 20)

Location maps by Ralph DeCew



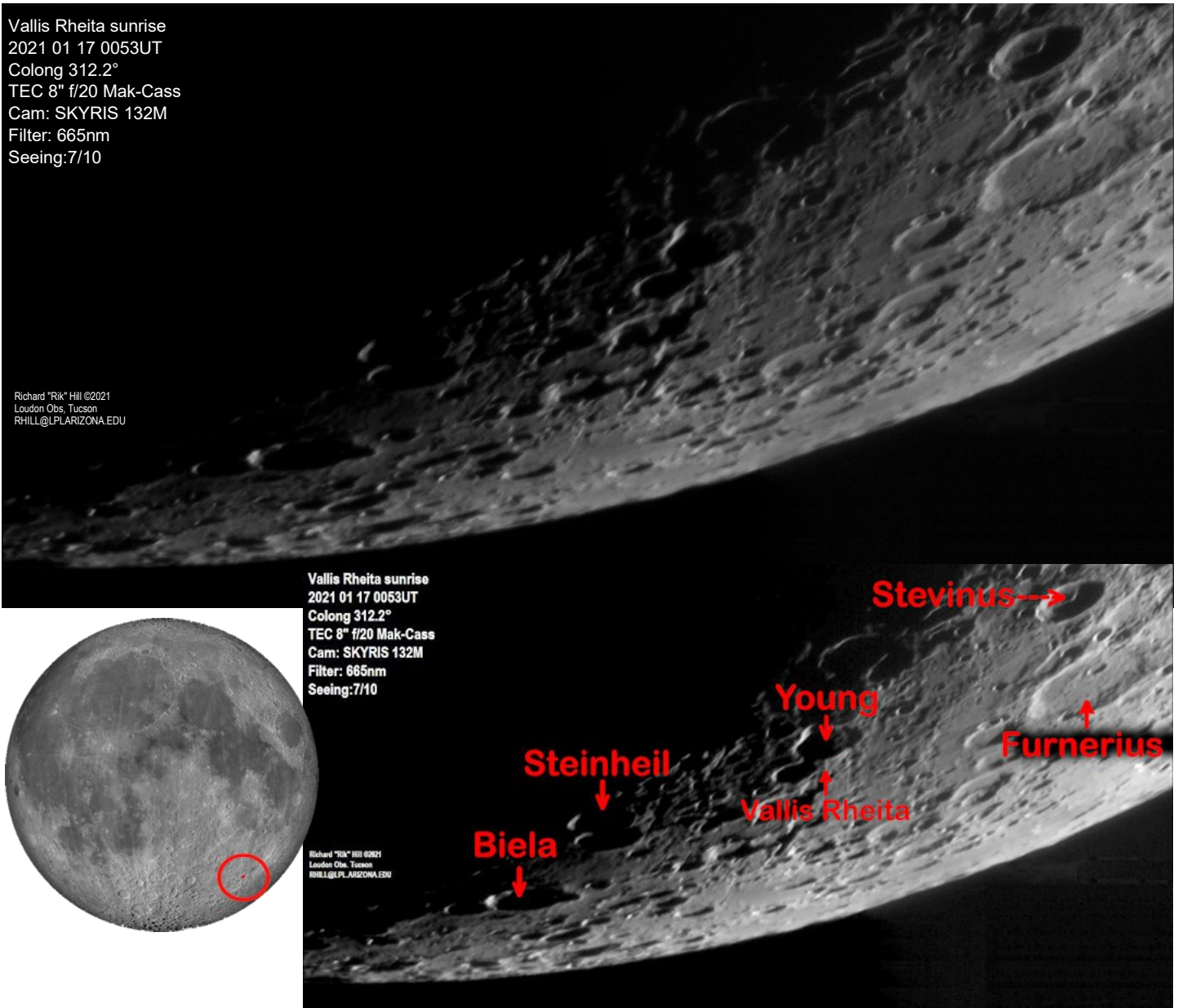
(Continued from page 19)

crater floor and make for interesting exploration under slightly higher sunlight. Fabricius sits on the floor of a much larger oblong crater (probably the result of another merger) Janssen (196km) with long curvilinear rimae on its floor, the Rimae Janssen. These rimae are unusual in that they are the only known rimae in the lunar highlands. Lastly below Janssen are twin craters, Steinheil (70km) and farther on Watt (68km) another crater with slumping cause by the proximity of the Steinheil impact.

### More trenching...

Here's the Janssen - Vallis Rheita region of the Moon that I featured in my last posting, but this is a day earlier. To show the limits of this image, near the right edge we see Furnerius (129km dia.) and above it Stevinus (77km) and the shadow filled Biela (78km) left of center. In the center you can see the

southeastern leg of Vallis Rheita that points towards the center of Mare Nectaris (in shadow here) and the other leg, barely discernible, in shadow above it. This latter portion points back towards Fracastorius and then Theophilus. Chuck Wood offers several possible origins for these two seemingly separate branches of the Vallis in his book *The Modern Moon - A Personal View*. While processing this image some fine scale features were noticed including a linear feature that runs parallel to the right of the lower leg of the Vallis. A search on LROC QuickMap confirmed its reality as a thin ridge. Another feature below the crater Young (75km) right on the terminator and overlain by the upper leg of the Vallis, looked like a processing artifact from the stacking program I used but again a look at QuickMap acted as confirmation that this was a linear low cliff. Ridges, rimae, wrinkles and cliffs abound in this chaotic region!





# History S.I.G.

## March 1988

About the cover: The editor, Ken Kelly, utilized a picture of the Mount Palomar Observatory from an old Detroit News Pictorial with the comment that this was the 20<sup>th</sup> anniversary of the WASP (??-ed.) and the 40<sup>th</sup> anniversary of the 200" telescope on Mount Palomar.

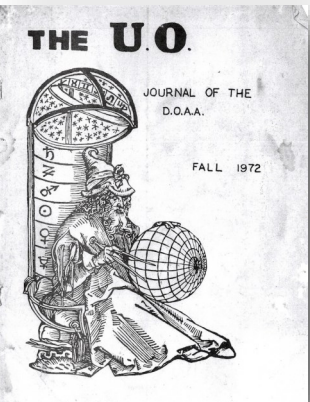
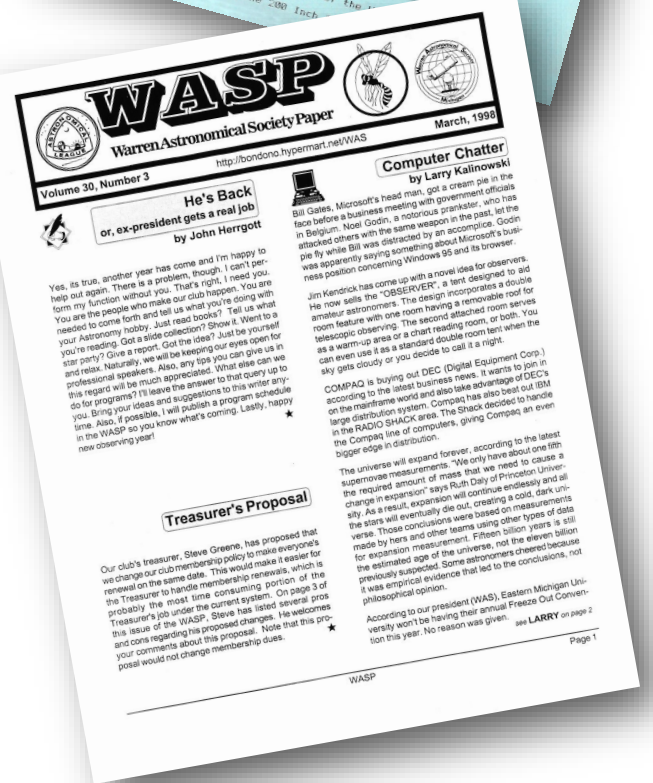
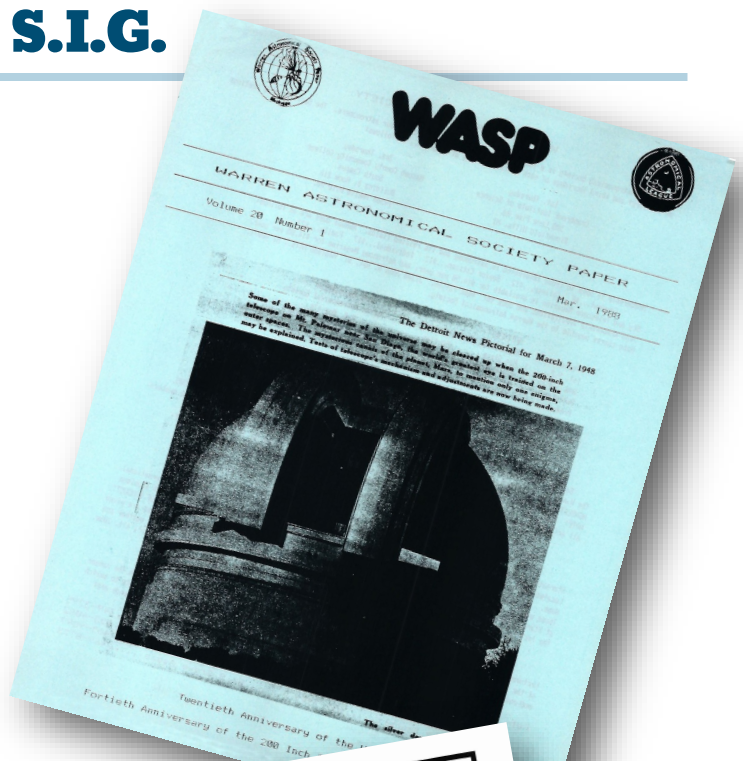


A news clipping of an obituary for a popular local astronomer, lecturer, Jim Loudon, is included.

Jeff Bondono reviews *Quasars, Redshifts, and Controversies*, by Halton Arp. Then, we have part four of "Getting Started in Astrophotography" by Larry F. Kalinowski (Low Cost Deep Sky Photography.) The issue concludes with part four of "Interesting Minor Planets" by Ken Kelly: (1144) ODA, (153) HILDA, (279) THULE, and (588) ACHILLES; followed by some charts: MINOR PLANETS FOR MAR.- APR. (Calculated by Ken Kelly): (29) Amphitrite, (4) Vesta, (10) Hygiea, and (14) Irene

## March 1998

"He's Back or, ex-president gets a real job" by John Herrgott where the new 1<sup>st</sup> VP proposes ideas for club member presentations. Worth repeating here: "You are needed to come forth and tell us what you're doing with your Astronomy hobby. Just read books? Tell us what you're reading. Got a slide collection? Show it. Went to a star party? Give a report. Got the idea? Just be yourself and relax." Also in this issue: "Computer Chatter" by Larry Kalinowski, "Treasurer's Proposal" (the club treasurer, Steve Greene, points out the current method of membership renewal -they occur on the anniversary of joining the club -is a drain on the treasurer's time and resources. The issue also contains Astro-Facts by Greg Milewski. Then, the pros and cons of the proposal are laid out. The WAS finally adopted the annual format in 2011. Following this were the excellent "Meeting Minutes" by Glenn Wilkins.

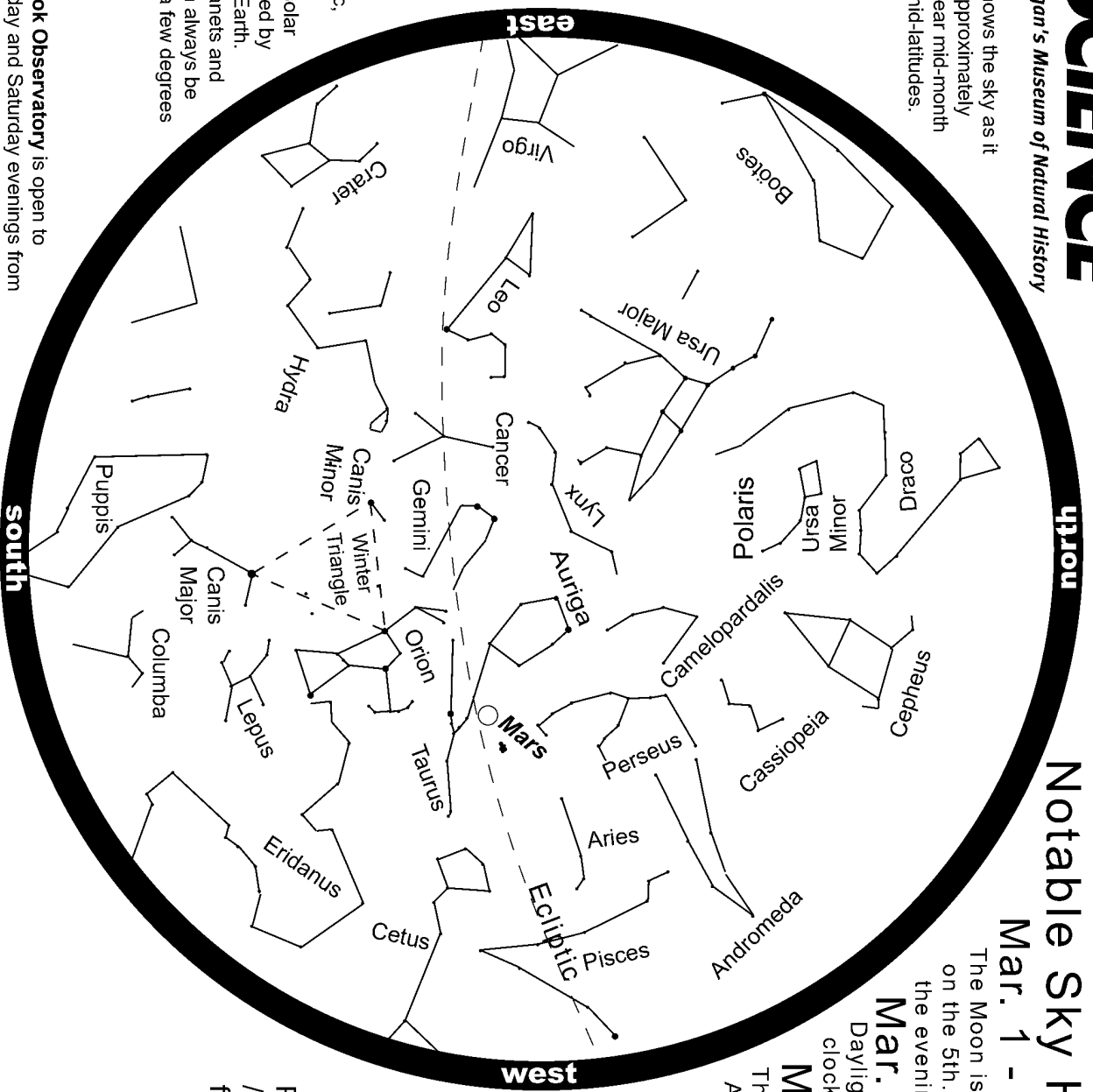


## From the Scanning Room

Gary Ross sent in a copy of the D.O.A.A.'s (The Detroit Observational and Astrophotographic Association) newsletter: *The Underground Observer*. He wrote an article in there, commenting it may be "One of the worst pieces I wrote in last 1/2 century". This editor isn't so sure about that, but you can judge for yourself as I went and digitized it: <http://www.warrenastro.org/was/newsletter/DOAA/DOAA-1972-fall.pdf>

Dale Thieme, Chief scanner

This chart shows the sky as it appears at approximately 10pm 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>

# MARCH 2021

## Notable Sky Happenings

**Mar. 1 - 7**

The Moon is above Antares in the S in the predawn sky on the 5th. Mars is to the left of the Pleiades in the W the evening of the 5th and 6th.

**Mar. 8 - 14**

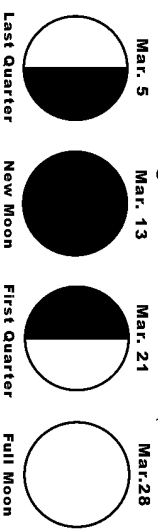
Daylight time begins at 2:00am on the 14th. Set clocks forward one hour at bedtime on the 13th.

**Mar. 15 - 21**

The Moon is at the upper left of Mars and Aldebaran is at the lower left in the W the evening of the 19th. The March (Spring) Equinox is at 5:37am EDT on the 20th.

**Mar. 22 - 31**

Moon is at the lower right of Pollux, Castor is above on the 22nd (S eve.). Moon is above Regulus on the 25th (SE eve.).



## Now Showing

Please visit [science.cranbrook.edu/explore/acheson-planetarium](http://science.cranbrook.edu/explore/acheson-planetarium) for program updates.



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



Cheryl Kaplan - Comet NEOWISE

March 2021

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Cranbrook Virtual Meeting	2	3	4	5	6 Mercury easy to see at dusk
7	8	9	10	11	12	13 New Moon
14 Daylight Saving Starts	15	16	17 St Patrick's Day	18 Macomb Virtual Meeting	19 Mars 1.9'N of Moon	20 Vernal Equinox
21	22	23	24	25	26	27 Virtual Stargate
28 Palm Sunday Holi Full Moon	29	30	31			





## 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](mailto: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 February 17, 2021.

There will be no open house in March as the observatory will remain closed until further notice due to the COVID-19 pandemic.

Virtual observing may be possible from Northern Cross Observatory (NCO) on February 27, 2021 weather permitting and if Doug Bock is available to host it.

Riyad I. Matti  
2021 WAS 2nd VP, Observatory Chairperson

## Treasurer's Report

As of 2/18/2021:

Memberships: 158

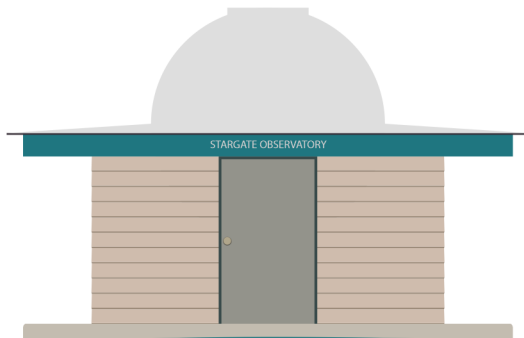
Amount in main WAS account: 22,457.49

Amount in WAS GLAAC account: \$3,375.18

Amount in PayPal account: \$909.67

I've received the latest round of checks that arrived at the Post Office last week, and will begin processing those. Please email me at [at-  
bsigma@gmail.com](mailto:bsigma@gmail.com) if you have any concerns or questions about your membership status. G.M. Ross, we got your postdated check and it will be deposited in time to maintain your membership status.

Adrian Bradley,  
Treasurer



### Astronomical Events for March 2021

Add one hour for Daylight Savings Time  
Source:

<http://www.astropixels.com/ephemeris/astrocal/astrocal2021est.html>

Day	EST (h:m)	Event
02	00:19	Moon at Perigee: 365422 km
03	18:36	Mars 2.6°S of Pleiades
05	00:00	Mercury 0.3° of Jupiter
05	08:58	Antares 5.2°S of Moon
05	19:56	Moon at Descending Node
05	20:30	LAST QUARTER MOON
06	06:00	Mercury at Greatest Elong: 27.3°W
09	18:02	Saturn 3.7°N of Moon
10	10:35	Jupiter 4.0°N of Moon
10	19:00	Neptune in Conjunction with Sun
10	20:02	Mercury 3.7°N of Moon
13	05:21	NEW MOON
13	21:00	Mercury at Aphelion
18	00:04	Moon at Apogee: 405253 km
19	12:48	Mars 1.9°N of Moon
19	16:13	Aldebaran 5.2°S of Moon
19	22:31	Moon at Ascending Node
20	04:37	Vernal Equinox
20	14:15	Mars 6.9°N of Aldebaran
21	09:40	FIRST QUARTER MOON
23	05:26	Pollux 3.5°N of Moon
24	04:58	Beehive 2.6°S of Moon
25	19:17	Regulus 4.7°S of Moon
26	01:00	Venus at Superior Conjunction
28	13:48	FULL MOON
29	10:52	Spica 6.5°S of Moon
30	01:12	Moon at Perigee: 360311 km



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

There are a LOT of astronomy and space events happening during the month of April:

## Global Astronomy Month: April

Typically organized each April by Astronomers Without Borders, is the world's largest global celebration of astronomy. GAM brings astronomy enthusiasts together worldwide to celebrate "One People, One Sky." Unfortunately, their website and social media accounts have no mention of a 2021 event.



## Yuri's Night: April 12

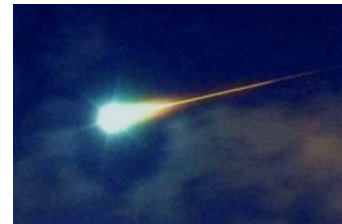
In commemoration of Yuri Gagarin becoming the first human venture into space on April 12, 1961, and the inaugural launch of the first Space Shuttle on April 12, 1981.

<https://yurisnight.net/> - Livestream and Watch Party New Moon this day



## Lyrids Meteor Shower: April 22, 23

The Lyrids is an average shower, usually producing about 20 meteors per hour at its peak. This shower is produced by dust particles left behind by comet C/1861 G1 Thatcher



## Earth Day: April 22

An annual event celebrated around the world to demonstrate support for environmental protection. First celebrated in 1970, it now includes events coordinated globally by the Earth Day Network in more than 193 countries.

<https://www.earthday.org/>



## Full Moon, Supermoon: April 27

As much as I dislike the word "Supermoon," the public knows about it, and it may be something we can use...



## Member Spotlight

Ken Bertin gave his "Size and Distance" talk to students at Toronto Centennial College on Monday and Tuesday Feb. 1st. Ken writes an "Astronomy of the week" post on his Facebook feed every Wednesday - he's discussed our solar system's planets and their moons, as well as asteroids and comets, and he's recently started discussing stars. He says he gets around 20 comments on these posts.

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(Continued from page 26)

**Adrian Bradley's** image of light pillars (see this month's cover of the WASP) was [shown on Space-weather.com](#) on Feb 14! The image is also in the [Sky & Telescope's online gallery](#). See Adrian's [post on Facebook](#).

**Bob Berta** gave an online presentation about the 50th anniversary of Apollo 14 for the Oakland Astronomy Club on Sunday Feb. 14th for around 20 people.

**Bob Trembley** gave an online presentation about NASA's Mars Perseverance Rover on Tuesday Feb. 16th for the Detroit Public Library.

**Jonathan Kade** gave a presentation about probes humankind have sent to Venus to the Seven Ponds Astronomy Club on Saturday Feb 20th.

**Angelo DiDonato** gave an online Solar System presentation to forty 5th grade students at St. Peters Elementary School in Macomb Township on Tuesday February 23rd.

**Bob Berta** also gave an online presentation to Troop 80 Boy Scouts on Dec. 21, 2020 for 12 scouts on general astronomy; he also helped scouts work on their astronomy merit badges.

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

## Great Lakes Association of Astronomy Clubs Board Meeting

Feb. 11, 2021 - ONLINE, 7pm - <https://umich.zoom.us/j/584733345>

AATB 2021: September 24/25, 2021

Call to order: 7:04 pm

Online:

- Adrian Bradley - GLAAC President, Lowbrows
- John Wallbank - GLAAC Vice President, Lowbrows
- Jeff Kopmanis - GLAAC Secretary, Lowbrows
- Brian Ottum - GLAAC Communications, Lowbrows
- Mike Ryan - GLAAC AATB Large Telescope Manager, Ford
- Bob Trembley - GLAAC Webmeister, Vatican Observatory Foundation, WAS
- Marcus Clarke - Lowbrows
- David Snyder - Lowbrows
- Amit Pandya - Lowbrows

**Discussion:**

Bank Account Status

Account is not created with Comerica yet  
AB (WAS Treasurer) can now transfer WAS GLAAC funds when we're ready  
JW will email AB regarding financial/accounting questions

501c3 Status

Form 990-EZ - to be filed around May  
MI-DNR picked up the event insurance

This was why they switched from Kensington *Metro* Park to a Michigan State Park

AATB 2021 - Sept 24/25 - **25th Year!!**

Covid-19 vaccination status -

**June 10** meeting will make the decision

(Continued on page 28)

*(Continued from page 27)*

Possible hybrid (some masking and spacing)  
in-person event - no worries  
virtual/online event - if things aren't ready

Contact DNR for Island Lake State Park

Event Tasks

In-Person - Tent reservation in mid-June  
All: Start lining up speakers  
Will need Hosts for each Presenter/Session  
MINIMUM of 30mins between online sessions  
Possibly more interactivity for selected events

#### **Adjourn:**

Motion to adjourn by **AB**, seconded by **JW**. Approved by unanimous vote.

Meeting Adjourned at 8:03 pm

TODO:

**JW**: will contact Bridgette @ DNR regarding date at Island Lake SP

**AB**: Contact tent vendor regarding our decision dates (mid-June)

~~**JK**: Send past years' notes to Dave Snyder, Marcus Clarke and Amit Pandya~~

Comments from Zoom Chat:

**Brian Ottum**: "There are MANY tent suppliers. Our previous supplier came from the THUMB! I believe they subcontracted with someone else's tent. So we should have many options for tents when the time comes."

**Bob Trembley**: "I just started playing Dyson Sphere Program: [https://store.steampowered.com/app/1366540/Dyson\\_Sphere\\_Program/](https://store.steampowered.com/app/1366540/Dyson_Sphere_Program/)

Resource gathering, construction, supply lines on steroids. Eventually you end up building a Dyson Sphere"

**Next GLAAC Meeting: March 11, 2021 7:00 PM**

## **Michigan Dark Sky Update**

**(From emails from Sally Oey)**

**Chelsea**: Kathie Gourlay reports that the Chelsea Planning Commission is revising the Zoning Ordinance. It already includes a pretty good lighting ordinance (way ahead of Ann Arbor!), but there are some significant loop holes, including streetlights. Chelsea has light polluting, acorn-design streetlights. Can anyone support Kathie in identifying issues, recruiting sympathizers, and approaching city officials? She has initiated contact with the Development Director. We'll need citizens to provide input when the Zoning revisions are posted for public comment. Residents of Chelsea are especially needed, but others are also helpful: [gourlay222@gmail.com](mailto:gourlay222@gmail.com).

**Grass Lake**: Congratulations to MIDS member Nick Zinis, who has been elected to the village Board of Trustees! Nick is originally from Northern Michigan and is passionate about dark skies. He's planning to review the zoning code in Grass Lake for good dark sky practices. Grass Lake residents, you can connect with Nick at [nzinis@gmail.com](mailto:nzinis@gmail.com).

*(Continued on page 29)*

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**Annie Blackwell, Sophie Grillet, Shari Thompson, and Zayd Mohamud** are making big progress on the dark sky activity for families. The current plan is to pitch it for grades 2-6. It now has Sophie's delightful artwork. If anyone wants to test it out on their kids, please let them know: [aebblackw@umich.edu](mailto:aebblackw@umich.edu), [sophiegrillet@gmail.com](mailto:sophiegrillet@gmail.com).

**Detroit, Belle Isle:** The Belle Isle Park Manager was scheduled to present the Urban Night Sky Place proposal to the DNR Section Chiefs in December. Jerry Hasspacher is awaiting an update on that. We're hoping that a green light means we can formally propose to the Belle Isle Park Advisory Committee.

**Dr. T.K. Lawless International Dark Sky Park:** Jeff Rechten shares that MLive is continuing to cover Michigan's newest IDA Dark Sky Place. [Night-time star gazing dates](#) are published for 2021, but please be aware that star gazers are often forgetful of pandemic social distancing.

**Bob Stencil** shares an extensive [Denver Post article](#) that describes, among other things, Denver's streetlight conversion project and public response to light pollution. Bob is a UM alum and leading dark sky efforts in Colorado. He can answer any questions related to their efforts: [colorado.ida@gmail.com](mailto:colorado.ida@gmail.com).

**John Mirsky** shares this [YouTube video](#) on gardening, that also addresses light pollution's effects on insects around minute 44:30.

**Heidi Trudell** shares this [energy savings calculator](#) that calculates the cost of having lights on, and savings when replacing old bulbs with more energy-efficient ones, etc.

**Scio Twp, Miller/Wagner roundabout:** David Black is initiating discussion with Scio Township Supervisor Will Hathaway. Please him know if you'd like to get in the loop: [dblack2420@comcast.net](mailto:dblack2420@comcast.net), and cc me. We believe the roundabout illumination exceeds the guidance from the Illuminating Engineering Society (IES).

**Scio Twp:** A new roundabout at Liberty / Zeeb has just been [announced on MLive](#), to be built this summer.

**Chelsea Zoning Ordinance:** Kathie Gourlay's group is requesting a meeting with the Planning Commission and has submitted suggested revisions to the draft. Please contact her if you'd like to join their efforts: [gourlay222@gmail.com](mailto:gourlay222@gmail.com).

**Upper Peninsula:** [The Environmental Law and Policy Center](#) based in Chicago is working to designate 4 new federal Wilderness areas in the Ottawa National Forest of the U.P.: Ehlco, Trap Hills, Norwich Plains, and Sturgeon River Gorge. Michigan Dark Skies will sign on to the submission, and they're looking for more supporters. For info, or if your organization would like to support, please contact Tyler Barron: [TBarron@elpc.org](mailto:TBarron@elpc.org).

**Detroit, Belle Isle:** The DNR Park Manager is trying to get Jerry Hasspacher's group scheduled to present to the BI Park Advisory Committee at their April 22 meeting. This is unconfirmed.

**Sherri Smith** shares the attached article from Scientific American about light pollution killing insects.

**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!

**-Bob Trembley  
Outreach**



# Meeting Minutes

## BOARD MEETING – February 1, 2021

Meeting was called to order by President Diane Hall at 6:30 PM via WebEx.

Officers present: Dale Partin, Riyad Matti, Mark Kedzior, Adrian Bradley, Dale Thieme, Bob Trembley – quorum present. Members in attendance – Jonathan Kade

### Officer Reports:

1<sup>st</sup> VP – Dale Partin reported that we are set up with presenters until June. He also reported that Macomb will not be available for in person meetings until at least the Winter 2022 semester.

2<sup>nd</sup> VP – Riyad Matti reported that he did his regular check on Stargate Observatory at Wolcott Mill – everything was in good condition. Due to the pandemic the observatory remains closed until further notice. He reported that Doug Bock did a virtual Open House with eleven people in attendance.

Secretary – Mark Kedzior reported that minutes of January meetings were posted in the WASP. He also reported on the recent mail pickup from WAS PO box in Warren.

Treasurer – Adrian Bradley reported on PayPal activity. All incoming checks will be deposited this month and will be reflected in the March treasury report. Discussion on transfer of treasury accounts and signatures.

Outreach – Bob Trembley reported he did a virtual presentation for Connie Trembley’s class at New Haven Middle School and requested any outreach activities be reported to him for his report. Diane added to the outreach report by informing board that there will be a Palomar Outreach online event on Saturday, February 6 at 2PM.

Publications – Dale Thieme reported that the February 2021 edition of the WASP is posted and available on the WAS website.

Old Business – Diane and Dale Thieme reported that the 2021 WAS mailer was out via US Mail. Diane also reported that the 1<sup>st</sup> order of calendars was shipped. She also reported that the calendar printer will print replacements at no cost, but members must contact the WAS if a replacement calendar is desired. The cutoff of replacement orders will be at the February 18<sup>th</sup> Macomb virtual meeting.

New Business – Discussion took place as to setting up a date and time at the Bank of America (Greenfield Rd. in Southfield) for the WAS treasury handover and signature authorizations (Mark Jakubisin, Adrian Bradley, Diane Hall, Jonathan Kade). Mark Kedzior will pick up all cur-

rent mail from WAS PO box and deliver to meeting site.

Riyad Matti to be reimbursed for approximately \$35 for caulking material for Stargate – has receipts for treasurer. Mark Kedzior will be reimbursed for \$15.25 for costs of mailing December Banquet prizes via US Mail – receipts have been provided to treasurer.

Motion to adjourn by Dale Thieme – supported by Adrian Bradley.

Meeting adjourned at 7:24PM.

Respectfully submitted,  
Mark Kedzior  
Secretary

## CRANBROOK MEETING February 1, 2021

The meeting was called to order at 7:30PM and a welcome to all by President Diane Hall. She then reviewed the ground rules, meeting format and etiquette of this virtual meeting and presentation so as to be enjoyed by all in attendance.

Diane announced that the WAS mailer was out to members via US Mail. She also gave an update on the 2021 WAS Calendar – she reports that the printer will replace the calendars with the US/Canadian holidays that were omitted in the first printing at no cost. She instructed that any person who wishes to receive the corrected calendar to contact WAS Publications and make request known NLT than the February 18<sup>th</sup> Macomb meeting. She also reported that the Seven Ponds Astronomy Club is hosting a “Palomar Virtual Event: Celebration of Mt. Wilson Observatory” on Saturday, February 6<sup>th</sup> at 2:00PM, for those interested in attending virtually. (Attendance at 7:40PM was 28 participants on WebEx – YouTube was 17).

### Officer Reports

1<sup>st</sup> VP – Dale Partin reports that at the Macomb February 18<sup>th</sup> meeting, Dr. Ilias Cholis, Assistant Professor of Physics at Oakland University, will be presenting “Anti-Matter Cosmic Rays and Dark Matter”.

At the March 1<sup>st</sup> Cranbrook meeting, Mr. Gary M. Ross begins with his short presentation of “The Case Against Mars”, followed by the main presentation by Dr. Gilbert Levin, Lead Scientist of the 1976 Viking Lander mission to Mars, with “Is There Life On Mars?”.

2<sup>nd</sup> VP – Riyad Matti reported his monthly inspection of our Stargate Observatory and found everything is in good order, but is still closed due to the COVID pandemic issue.

*(Continued on page 31)*

*(Continued from page 30)*

**Secretary** – Mark Kedzior reported that minutes of the WAS January meetings are posted in the February 2021 edition of the WASP.

**Treasurer** – Adrian Bradley reported that the Treasury report is posted in the February 2021 edition of the WASP. He reports the WAS has 152 members, and is encouraging members to use PayPal to submit their membership dues and Astro League memberships.

**Outreach** – Bob Trembley gave two virtual presentations to New Haven Middle School. Ken Bertin gave a two hour virtual presentation to Centennial College

“Miles to Kilometers” to fifty-two persons in attendance.

**Publications** – Dale Thieme reported that the February 2021 edition of the WASP was posted on the WAS website 1/31/2021.

### **Sub-Group Reports –**

**Solar** – Very little to no activity on the sun was observed.

**History** – No report as of this time.

**Astronomical League** – Annual memberships are \$7.50 a year if interested.

Bill Beers made a PSA encouraging members to get a COVID vaccine and would share information at the break.

**Observing Reports –**

Discussion on the Sky & Telescope March 2021 issue of “The Dimming of Betelgeuse”

David Levy (from Vail, AZ) – Saw no meteor activity from his locale. He also

reported that he held his 22,000th observing session with his 1<sup>st</sup> session taking

place in October 1959. He also read Leslie Peltier’s writing of “Observations on

Comets”.

Adrian Bradley shared images taken by Pointe Aux Barques Lighthouse in Port

Hope in Michigan’s Thumb.

Jon Blum commented on President Diane Hall’s February President’s Report in the

WASP.

**IN THE NEWS** – presented by Bob Trembley, (of note):

Mars Perseverance Rover landing on February 18<sup>th</sup> – ISS 2<sup>nd</sup> spacewalk of the year – upgrades taking 6 hours 56 minutes –

Biggest black hole discovered – 40 billion solar masses in Abell 85 galaxy cluster

in constellation of Cetus –

European Space Agency probe Rosetta orbiting Comet 67P – “Seasonal” color

changes on comet upon approaching the sun –

NASA Administrator Jim Bridenstine departs – Steve Jurczyk named acting NASA

**Director –**

IN THE SKY – Bob highlighted “Morning Dance” of planets Jupiter, Saturn, Venus and Mercury - Moon phases of the month - no sunspots but active prominences and complexes on sun –

### **SHORT PRESENTATION**

Bob Berta presents “The World’s Largest Refractor” – Highlights of presentation:

- Telescope was constructed for the Paris Exhibition of 1900
- Objective lens of two elements had diameter of 49”- Focal length of 200 feet (three times that of Yerkes 40” refractor).
- Yerkes refractor would be a finder scope on this refractor).
- Had 5’ focusing assembly.
- f/stop of 45.6 – lowest magnification of 500x.
- Two sets of objectives were made.
- One for visual and one for imaging.
- An optical flat reflected image into a probably distorted objective (optical tube was stationary.)
- Some scientific observations were made.
- Optics were later tested and found to be of good quality.
- Optics are currently in storage at the Paris Observatory.
- Fabrication of objectives began in 1886.

Questions and discussion followed presentation.

**BREAK** – Dale Hollenbaugh shared recent images of the California Nebula and shared photos of his astro imaging equipment used.

### **MAIN PRESENTATION**

Dr. Kapila Clara Castoldi, Professor of Physics and Astronomy, Oakland University, presenting “Kuiper Belt Objects . . . . And The Demoting of Pluto”.

Highlights of her presentation:

- Solar System had nine known planets until 2006
- Uranus discovered by accident in 1781 by William Herschel
- Perturbations in orbit of Uranus led to discovery of Neptune in 1846
- A 14 year search led to discovery of Pluto in 1930 by Clyde Tombaugh
- Photos taken between 1/23/1930 and /27/1930 showed Pluto’s movement in background of star
- 248 years to orbit Sun
- Explained solar nebula model of formation of solar system, consisting of the sun, rocky planets, icy planets, and “leftovers of asteroids and comets. rocky asteroids formed inside ice line, icy comets formed outside ice line.
- Asteroids are rocky leftovers from formation of solar system, occupy belt between Mars and

*(Continued on page 32)*

(Continued from page 31)

Jupiter, asteroids in this belt equal 1/1000 of the mass of Earth

- Jupiter still causes collisions between asteroids creating meteorites that strike the Earth – come in all sizes.
- Ceres and Vesta are largest of asteroids.
- Comets are icy leftovers from formation of solar system – Kuiper Belt comets are found beyond Neptune’s orbit 30 to 100 AU from Sun with 100K+ comets in orbit in plane of the planets.
- Oort cloud goes out to about 50,000 AU from Sun and is a spherical region centered on Sun with random orbits of approximately one trillion comets
- Pluto likely one of Kuiper Belt objects.
- Pluto’s orbit around the Sun varies between 29.7 AU to 49.3 AU with orbital period of 248.6 years
- Orbit Inclined 17.2 degrees to the ecliptic.
- Pluto is denser than Jovian planets and less dense than terrestrial planets.
- Orbit intersects Neptune.
- Diameter of Pluto is 2300 KM – its large moon Charon is two-thirds its size at 1300 KM in diameter.
- In 1950 Gerard Kuiper theorized that the solar system should not come to abrupt end.
- 1992 an object 130 KM was discovered on outskirts of solar system.
- Over 2000 KBO’s detected with at least 35,000 estimated to exist, some have their own moons
- Graphics showing orbits of KBOs were shown both with polar view and ecliptic view – KBOs are detected using CCDs 100x more sensitive than normally used.
- Three images taken 90 minutes apart to look for moving object with a manual scan.
- In August 2006 “The Fall of Pluto” International Astronomical Union listed their criteria for definition of planet. Pluto failed 3<sup>rd</sup> criteria in definition and was demoted to dwarf planet.
- The asteroids Ceres and Eris were promoted to dwarf planet status.
- The New Horizons probe discovered the two smallest moons of Pluto.
- New Horizons has extended mission beyond Pluto.
- New Horizons travels 3 AUs a year with fuel estimated to last to mid-2030’s or longer
- It is not equipped to look for Planet X.
- Following presentation, Dr. Castoldi fielded many questions regarding the Oort Cloud and Pluto being demoted.

Both presentations can be seen in their entirety at:

<https://www.youtube.com/warrenastro>

Meeting was adjourned at 9:35PM.

## MACOMB (Virtual) MEETING

FEBRUARY 18, 2021

The February 2021 Macomb meeting of the Warren Astronomical Society was called to order at 7:30PM by 1<sup>st</sup> Vice President Dale Partin (for President Diane Hall). Dale welcomed all in attendance via WebEx and YouTube, and commented on this significant day of the successful landing of the Mars rover Perseverance this afternoon.

### Officer Reports

1<sup>st</sup> VP Dale Partin announced the March meeting presentations:

For our Monday, March 1<sup>st</sup> Cranbrook meeting, a short presentation by Mr. Gary M. Ross, with “The Case Against Mars”, followed by the main presentation by Dr.

Gilbert Levin, Lead Scientist for the Mars Viking Lander mission in 1976, with “Is There Life on Mars?”.

At the March 18<sup>th</sup> Macomb meeting, Mr. Matt Dietrich of Planewave Instruments,

a Michigan based telescope manufacturer of telescopes up to one meter in diameter, will be talking about Planewave Instruments and astronomy technology.

2<sup>nd</sup> VP Riyad Matti made his regular inspection/tour of Stargate Observatory – everything was in good order (he found that the winter storm and winds blew snow under the small opening around the base of the dome which caused snow to accumulate inside the observatory – Riyad immediately went into action and shoveled the snow out of the observatory). The observatory is still closed to public events due to the COVID 19 pandemic restrictions in place.

Secretary – Mark Kedzior had nothing to report as of this time, but did state that the minutes of the Cranbrook 2/1/2021 Board and General Meeting were complete and sent to the Publications Director for the March issue of the WASP.

Treasurer – Adrian Bradley reported that the transfer and signature process is complete as with regard to the WAS account, reporting over \$22,000 in account, with approximately 150+ memberships, and will have detailed report for the March 1<sup>st</sup> meeting.

Publications – Dale Thieme had nothing to report as of this time.

Outreach – Bob Trembley reported that he did a virtual presentation on the Mars Perseverance rover for the Detroit Public Library on February 16<sup>th</sup>, and asked that individuals forward their outreach activities to him for his outreach report.

David Levy (via Vail, AZ) - He extended best wishes

(Continued on page 33)



(Continued from page 32)

to all from Wendee and himself – he noted that February 18<sup>th</sup> will be remembered for the Mars Perseverance landing, but also that on February 18, 1930, Clyde Tombaugh discovered Pluto – he then read a quote from Clyde Tombaugh, which is found in David Levy’s biography.

**IN THE NEWS** presented by Dale Thieme: “Seven Minutes of Terror” – the Perseverance rover successfully landed on Mars at Jezero Crater earlier in day.

On 2/2 the SpaceX SN9 exploded during testing. The European Space Agency is in process of recruiting 4-6 astronaut candidates and 20 reserve astronauts for future missions – also will be recruiting individuals with some physical handicaps to participate in missions.

IN THE SKY – Rupes Recta – “The Straight Wall” observable day after 1<sup>st</sup> quarter on the Moon.

Moon and M35 are close and is a good binocular sight – on February 24 the Moon and M44 “Beehive Cluster” are in close proximity to each other – on February 24 a lunar occultation takes place in the southeastern US of Kappa Geminorum (formally known as Alhena or Al Kirkab).

## OBSERVING REPORTS

David Levy reports on his solar observations – no sunspots but seven prominences observed – of note he observed a long dark filament on photosphere .

Adrian Bradley – Shared image of light pillars taken at Alcona Dam Pond facing Curtisville – this image was posted on the main page of Spaceweather.com on February 14<sup>th</sup>.

Dale Hollenbaugh – shared his four-hour image of combined 5-minute exposures of the “Spaghetti Nebula” - a supernova remnant 3000 light years away in the constellation of Taurus, spanning about 150 light years across – about 7 moons wide – designated Sharpless 2-240 – the supernova occurred about 50,000 years ago.

Doug Bock – Shared image of ISS passing overhead on February 3 – also shared image of NGC 2359 – “Thor’s Helmet”- in constellation Canis Major and spiral galaxy NGC 2336 in Camelopardalis.

“Ask a Dumb Question” – (drum roll) - “What is easier to explain – a definition of a planet or a lenticular galaxy?” – Discussion followed –

**BREAK** – Discussion held on the pros and cons of one-shot color cameras and monochrome cameras in astro imaging with Doug Bock, Bill Beers, Tim Campbell and Dale Hollenbaugh, providing insight on the use of these cameras.

## MAIN PRESENTATION

Dr. Ilias Cholis, Assistant Professor of Physics at Oakland University, presented “Anti-matter Cos-

mic Rays and Dark Matter”.

In this presentation, Dr. Cholis explained how anti-matter cosmic ray measurements can advance our understanding of high-energy astrophysical phenomena in our own galaxy. He also explained how in the last few years, satellite experiment such as the Alpha Magnetic Spectrometer on board the International Space Station measures antimatter cosmic ray fluxes, including positrons (the antiparticles of electrons), antiprotons (the antiparticles of protons) and recently, antimatter nuclei. These measurements are providing a novel probe to search for new physics, including annihilations of dark matter in the Milky Way.

At the conclusion of his presentation, Dr. Cholis fielded questions pertaining to his presentation. This presentation can be seen in its entirety at:

<https://www.youtube.com/warrenastro>

Meeting was adjourned at 9:45PM.

Respectfully submitted,  
Mark Kedzior  
Secretary

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## McMath-Hulbert Report

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We’re continuing cleanup in the main building, we now have the entire second floor organized and ready for resumption of post-Covid activities.

We offered a star party on February 6 at the Hawk Woods Nature Center. Hawk Woods is a city of Auburn Hills facility. Marty Kunz and Tom Hagen from MHAS gave an indoor program using Stellarium to teach about objects visible in the evening February skies and they also talked about different kinds of telescopes. Not surprisingly, the skies were cloudy. Six members of the public attended. Hawk Woods has a superb new nature center building and we are looking forward to our next star party there.

Work continues on the spectroheliograph in the second tower, we resurrected an old slide projector that we’ll be using to project test images onto the input slit.



## 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
<a href="#">Astronomy Club at Eastern Michigan University</a>	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
<a href="#">Farmington Community Stargazers</a>	Farmington Hills	Members: Last Tuesday of the month Public observing: 2nd Tuesday of the month
<a href="#">Ford Amateur Astronomy Club</a>	Dearborn	Fourth Thursday of every month (except November and December) at 7:00 PM
<a href="#">McMath-Hulbert Astronomy Society</a>	Lake Angelus	Board and paid members-First Sunday of the month Public open house—first Saturday at 11 am
<a href="#">Oakland Astronomy Club</a>	Rochester	Second Sunday of every month (except May)
<a href="#">Seven Ponds Astronomy Club</a>	Dryden	Monthly: generally the Saturday closest to new Moon
<a href="#">Sunset Astronomical Society</a>	Bay City/Delta College Planetarium	Second Friday of every month
<a href="#">University Lowbrow Astronomers</a>	Ann Arbor	Third Friday of every month
<a href="#">Warren Astronomical Society</a>	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](#)      Bob Trembley: [Balrog's Lair](#)  
 Bill Beers: [Sirius Astro Products](#)      Bob Trembley: [Vatican Observatory Foundation Blog](#)  
 Jeff MacLeod: [A Life Of Entropy](#)

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](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!

## Taking the Dog Stars for a Springtime Walk:

# Sirius and Procyon!

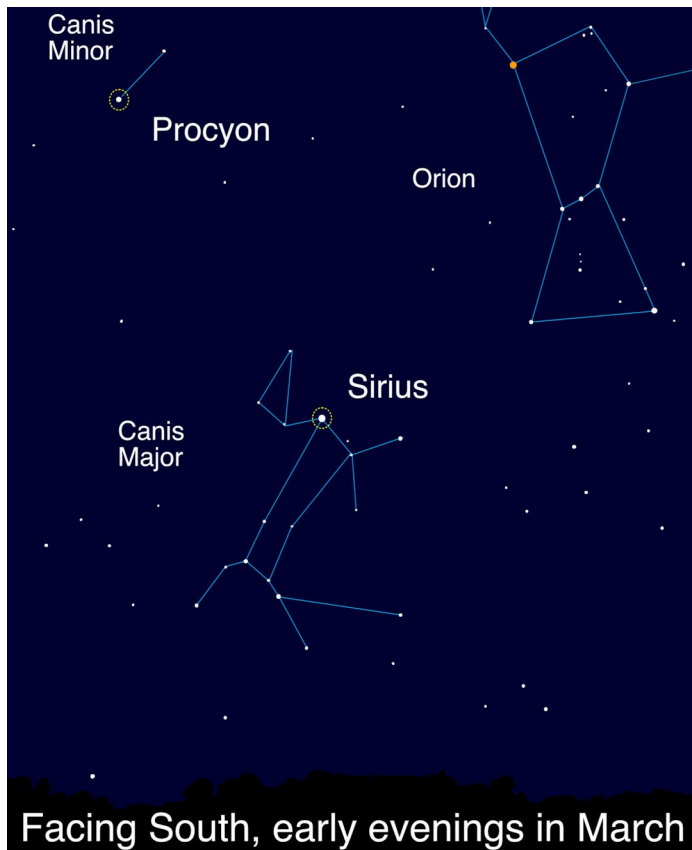
David Prosper

March skies feature many dazzling stars and constellations, glimmering high in the night, but two of the brightest stars are the focus of our attention this month: Sirius and Procyon, the dog stars!

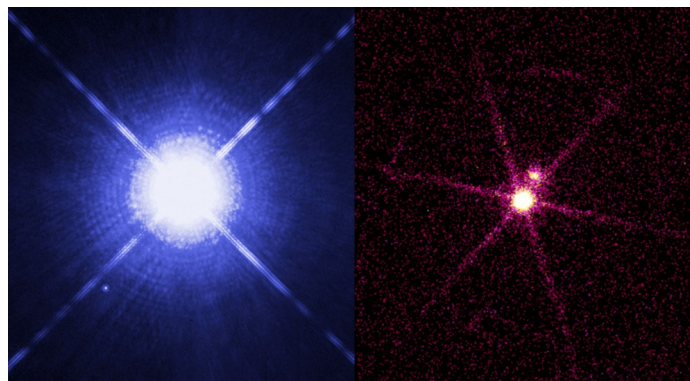
Sirius is the brightest star in the nighttime sky, in large part because it is one of the closest stars to our solar system at 8.6 light years away. Compared to our Sun, Sirius possesses twice the mass and is much younger. Sirius is estimated to be several hundred *million* years old, just a fraction of the Sun's 4.6 *billion* years. Near Sirius - around the width of a hand with fingers splayed out, held away at arm's length - you'll find Procyon, the 8<sup>th</sup> brightest star in the night sky. Procyon is another one of our Sun's closest neighbors, though a little farther away than Sirius, 11.5 light years away. While less massive than Sirius, it is much older and unusually luminous for a star of its type, leading astronomers to suspect that it may "soon" - at some point millions of years from now - swell into a giant star as it nears the end of its stellar life.

Sirius and Procyon are nicknamed the "Dog Stars," an apt name as they are the brightest stars in their respective constellations - Canis Major and Canis Minor - whose names translate to "Big Dog" and "Little Dog." Not everyone sees them as canine companions. As two of the brightest stars in the sky, they feature prominently in the sky stories of cultures around the world. Sirius also captures the imaginations of people today: when rising or setting near the horizon, its brilliance mixes with our atmosphere's turbulence, causing the star's light to shimmer with wildly flickering color. This vivid, eerie sight was an indication to ancient peoples of changes in the seasons, and even triggers UFO reports in the modern era!

Both of these bright stars have unseen companions: tiny, dense white dwarf stars, the remnants of supermassive companion stars. Interestingly, both of these dim companions were inferred from careful studies of their parent stars' movements in the 1800s, before they were ever directly observed! They are a challenging observation, even with a large telescope, since their parent stars are so very bright that their light overwhelms the much dimmer light of their tiny companions. The white dwarf stars, just like their parent stars, have differences: Sirius B is younger, brighter, and more energetic than Procyon B. Careful observations of these nearby systems over hundreds of years have helped advance the fields of: astrometry, the precise measurement of stars; stellar evolution; and astroseismology, the study of the internal structure of stars via their oscillations. Discover more about our stellar neighborhood at [nasa.gov](https://nasa.gov)!



Sirius and Procyon, the loyal hunting dogs of nearby Orion the Hunter! What other stories can you imagine for these stars? Learn about "Legends in the Sky" and create your own with this activity: <https://bit.ly/legendsinthesky>  
Image created with assistance from Stellarium.



Sirius A and B imaged by two different space telescopes, revealing dramatically different views! Hubble's image (*left*) shows Sirius A shining brightly in visible light, with diminutive Sirius B a tiny dot. However, in Chandra's image (*right*) tiny Sirius B is dramatically brighter in X-rays! The "Universe in a Different Light" activity highlights more surprising views of some familiar objects: <https://bit.ly/different-light-nsn> NASA, ESA, H. Bond (STScI), and M. Barstow (University of Leicester) (*left*); NASA/SAO/CXC (*right*)



# What I'm Playing Now: Dyson Sphere Program

By Bob Trembley

Available in [early-access on Steam](#), Dyson Sphere Program is a science fiction themed [factory simulation](#) game where the ultimate goal is to harvest resources from planets across multiple star systems and build a [Dyson Sphere](#) megastructure.



Left: Screenshot from Dyson Sphere Program video on Steam. A Dyson Swarm is in equatorial orbit, and the sphere lattice is being built. Credit: Youthcat Studio.

The learning curve is pretty steep, but if you like engineering and problem-solving games, this is worth a look - it's been selling like gangbusters since release on Jan. 21st. There are an enormous number of articles and videos online with hints and tips on how to learn and play the game. The fact that there's a game out there with this subject matter pretty much guaranteed I had to get it. Thanks to Parker Huellmantel for telling me about this!

The game follows a familiar format of resource-gathering, construction, technology-research and expansion; in its current state it could be considered to be feature-complete, but the developers are continuously releasing fixes and updates based on player feedback, and there is a lot of development planned for the future.

I watched a [video from 2018](#) about how to build a Dyson Sphere, and this game implements *every single one* of the concepts discussed! At the time of this writing, I'm only about halfway through the technology tree, and have only just started on the technology to construct my first [Dyson Swarm](#).

Now, every time I see the water pipes and air ducts in my basement's ceiling, I can not help but think of the conveyor-systems I've created in this game...



Right: Screenshot from Bob's Dyson Sphere Program game showing a chemical processing factory (rear) and technology-research complex (foreground). Credit: Bob Trembley