

SKYNEWS



Venus and the Pleiades

April 4 2020

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The Eighth Sister

The position of Venus in the night sky coincides with the Pleiades star cluster once every eight years and RASC Victoria members were fortunate to have the opportunity to observe and image it over three days, at the beginning of the month. The skies were mostly clear over the three nights that Venus passed in front of the Seven Sisters. Clear skies or not, it's not easy to image something as bright as Venus against a Messier object, even one as luminescent as the Pleiades. If you expose for Venus, you don't get a good view of the stars. If you expose for the Pleiades, then Venus is ridiculously overexposed. For most astrophotographers it either comes down to balancing two imperfectly exposed objects or doing a lot of post-production work on your image.

People have been looking at Venus (*seen right, in an image by Nathan Hellner-Mestelman*) since the first hominid looked to the heavens. The Sumerians already knew the morning and evening “star” was the same object, despite numerous other ancient peoples failing to grasp this fact. They gave it the name of their goddess that shared the aspects of both love and war: Inanna. Galileo was the first recorded person to observe the different phases of the planet, similar to the phases of the Moon. Despite being one of the earliest observed objects in the sky, because of a heavy atmosphere, composed of carbon dioxide and sulphuric acid, it was only during the space age that we finally got our first view of its surface.

While the Soviet Union has received no love from Mars, during their numerous Cold War missions to the red planet, they were bit luckier with Venus. That's not to say that the toxic atmosphere of Venus didn't damage and destroy the probes they sent there, but they did manage to successfully send a series of orbiters, landers, and impactors to the planet. Venera 8 became the spacecraft to make the first successful landing in 1973 and two years later, Venera 9 not only landed but took images of the inhospitable surface, using a diamond lens to protect the camera. NASA focused on orbiters and flybys of Venus, but did have one spacecraft accidentally land on its surface in 1978. Pioneer 12 dropped multiple probes to study the atmosphere that were never intended to survive contact with the surface, but one did land and transmitted for an hour before its battery died.



As one of the brightest star clusters in the night sky, the Pleiades have long held a special place in the myths of ancient peoples. The first record made of this star cluster was painted on the wall of the Lascaux Cave in France, about 16 500 years ago. Called the Seven Sisters by the Greeks, there's a vision challenge for amateur astronomers to see how many you can see with the naked eye, making use of averted vision in a dark site. When Galileo became the first (again) to

observe this star cluster with a telescope, he published his findings about the 36 stars that he saw. Thanks to improvements in optics, we now know there are about 3000 stars in the Pleiades. This star cluster has also been the focus of Michel Michaud's double star project, resulting in the discovery of five new double stars in his 2012 paper, published in the Journal of Double Star Observations.



A number of RASCals (*like Bill Weir's image, left*) rose to the challenge of observing and imaging Venus as it passed in front of the Pleiades, with some excellent pictures and memories to show for their efforts. We'll do this again in 2028, when this transit once more plays out across the night sky.

Bruce Lane

Editorial Remarks



It was good to have an astronomical event like Venus passing in front of the Pleiades, as a welcome distraction from the current state of affairs. It also meant that *SkyNews* could show off some recent astrophotography from our members. It's certainly a much better alternative than having me do a set of film noir styled pictures of empty Victoria streets, punctuated by the occasional discarded newspaper, featuring headlines from days gone past. I liked the original *Twilight Zone* as much as anyone, but never planned to end up living in an episode of it. At least we have Astronomy and as a hobby *it is the middle ground between light and shadow, between science and superstition, and it lies between the pit of man's fears and the summit of his knowledge.*

The weather was a mixed bag this last month, but with a generous supply of good weather for amateur astronomers to point both their telescopes and cameras at the night sky. The weather cooperated for the majority of the three nights, when Venus moved across the Pleiades, but it was a bit less generous for the Lyrid meteor shower. We even had a Pink Supermoon! Sure, it was neither pink nor that much more super than the usual full moon, but that's life in the hyper sensationalized, online world for you.

In this issue of *SkyNews*, we'll have more recaps from our Centre's activities, another installment of *Better Know a RASCal*, as well as all the astrophotography and articles you've come to expect from the *Victoria Centre SkyNews*.

Bruce Lane: SkyNews Editor

President's Message for May

During the early dawn of February 16th, I obtained a glimpse of the future. After months of almost perpetual overcast, skies finally cleared. While looking northward towards Cassiopeia, I noticed a long precession of fairly bright evenly spaced satellites moving from left to right. It took about 10 minutes for this parade to pass. I realized that this must be the Starlink Constellation that had been mentioned in the news. When I searched the Internet to learn more, I was in for a surprise.

Starlink is a bold ingenious project with an ambitious mission to deliver high speed broadband internet to locations where access is unreliable, expensive, or completely unavailable. It plans to achieve this by deploying a vast constellation of communication satellites. The parent company, SpaceX, was founded by Elon Musk in 2002, and has developed a remarkable capacity to launch Falcon 9 rockets and successfully land them for reuse. This greatly reduces the launch costs. The communication satellites are stacked aboard the Falcon 9 in two columns of 30 and they gradually drift apart once they reach orbit. Each satellite is powered by a single solar panel, which gently unfolds. The satellites are maneuvered by ion jets using Krypton. This elaborate scheme sounds unwieldy, but when Starlink V0.9 was launched in May 2019 it actually worked!



Satellites are usually expensive "one off" devices that take years to build, but by employing the manufacturing expertise that Elon Musk honed at Tesla, Starlink can assemble 6 satellites a day at their Redmond Washington plant. This production rate allows Starlink to launch 60 satellites every two weeks! At that launch rate, Starlink can place 1584 satellites in a shell 550 km about the Earth by the end of 2021. They will be placed in 72 orbital planes inclined at 53 degrees. 22 satellites will occupy each plane and when in position they will form an exotic mesh surrounding the globe. Animation of this configuration reveals that the concentration of satellites is greatest between latitudes of 50 to 53

degrees. While this network will provide coverage over most of the globe, two additional phases have been approved by the FCC to increase capacity and speed. Phase two will add an additional 2800 satellites in an 1125 km altitude shell and phase three will add 7500 more satellites in a lower 340 km altitude shell.

When completed, an additional 12 000 satellites will be in orbit! This exceeds the 9000 satellites that have been launched during the last 50 years and the 5000 that are still in orbit. The first batch of 60 operational satellites was launched on Starlink 1 on November 11th, 2019 and the sixth Starlink mission occurred on April 22nd, bringing the total to 420. While Starlink obtained the necessary frequency approvals from the FCC, to prevent interference with radio astronomy, there was no governance regarding visual and infrared ground based astronomy. The initial Starlink V0.9 group was much brighter than anticipated and generated alarm from visual astronomers. Elon Musk is embarrassed about this oversight and is working with the astronomical community to mitigate the impact of this massive network. On April 27th, Musk announced VisorSat, an innovative sunshield that may significantly reduce the albedo of the satellites. Some of these shields will be tested during the next Starlink launch.

The satellites must be illuminated by the Sun to be visible. Due to the low altitude, the Phase 1 cohort will only be visible near twilight. The higher altitude Phase 2 will remain visible longer. Satellites are brightest when just launched, but will become dimmer as they ascend to operational altitude. Since twilight lingers into the late evening, near the Summer Solstice, the presence of this constellation will be most pronounced in the area of highest density over the Canadian skies this summer. So keep on the lookout for this new swarm of satellites while stargazing this summer. Please share your observations on the Virtual Astro Cafe web page or during the Astro Cafe Webinar, which will take place every Monday evening at 7:30 PM. In some ways, the unintended consequence of this mission resembles an outbreak of a “stellar virus”. And it could get worse as SpaceX has requested permission to place another 30 000 satellites in orbit! Let’s hope that the Starlink team creates a stellar vaccine soon and that skies will remain useable.

Wishing everyone good health and useable skies

Reg Dunkley



Astro Café: Now Online



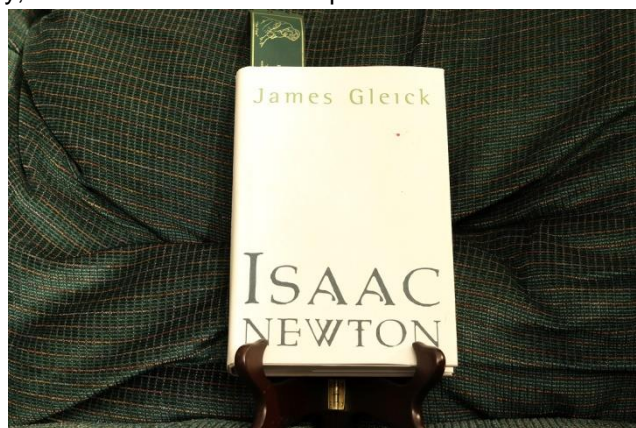
The weekly social gathering of amateur astronomers on Monday nights, known as Astro Café, is now online. As with many groups, we're trying to find ways to still function as a Centre, without meeting in person. Members are posting their astrophotography, short articles, as well as links to astronomy stories from the Web. Sadly you'll have to make your own coffee and the only cookies are those your browser picks up when you visit our website. You can access the *Virtual Astro Café* at: <https://victoria.rasc.ca/virtual-astro-cafe/>

For the last online session of April, for Astro Café, Kurt discussed the 30th anniversary of Hubble and Reg gave a presentation titled "The Space X Stellar Virus".

Bruce Lane

From the Library

The RASC Victoria Centre Library is housed in the Astronomy Department's faculty lounge, located on the 4th floor of the Elliott Building, at the University of Victoria. It contains over 500 titles, curated by Diane Bell, our RASC Victoria Librarian. Our library covers many aspects of astronomy: observing, astrophotography, telescope construction, space exploration, astrophysics, and much more. Normally, the library is opened up during the social gatherings in the faculty lounge, after our monthly meetings, with coffee, juice, and cookies provided by our Centre. I've been doing book reviews of the contents of our Centre's library, but until the resumption of our monthly meetings, I'll be doing reviews of the astronomy books from my personal library, at least ones that can be purchased online or better yet at your local bookstore.



This month we're taking a closer look at *Isaac Newton*, by James Gleick. I was first introduced to the writing of Gleick when I picked up a copy of *Chaos: Making a New Science* (featured in this column, in the January 2019 issue of *SkyNews*). You probably couldn't ask for a better writer to climb the mental mountain that is Isaac Newton. When one of Gleick's books goes to print it's a safe bet that it will be in the running to win its share of prestigious awards. I'm really looking forward to reading his book about Richard Feynman, sometime in the near future.

James Gleick takes you through Newton's childhood to his rapid ascent of academia, despite his reluctance to publish his work. Newton figured large among those responsible for laying the foundation of the Age of Enlightenment, even while his private work in Theology and Alchemy, straddled both the new and the old world. It's a deep dive into one of the greatest minds of science, who spent a lifetime wrestling science away from the philosophers. If you've ever owned or used a Newtonian reflector telescope, you know who to thank. *Isaac Newton* is above all an excellent read and one available online or better yet by order from your local bookstore.

Bruce Lane



Hercules Star Cluster (M13), by Doug MacDonald, April 18, 2020

Hill and Dale (Observing on the Island)

While the scheduled weekly observation sessions at the Victoria Centre Observatory are taking a hiatus for the immediate future, for those of you with astronomy gear the night sky hasn't gone anywhere. After Venus finished passing in front of the Pleiades, there was still plenty of images being taken of the atmosphere shrouded planet, as John McDonald captured a series of the crescent planet (*seen right*). People took advantage of the abundant clear skies to observe and image the night sky through much of April, as well as enjoying other planetary occultations. Doug MacDonald took the opportunity to welcome back some familiar friends in the summer night sky with his yearly imaging project (*M13 seen above*). While our Astronomy Day event was among the events cancelled, Dorothy and Miles Paul spent the evening under the stars with their telescopes and cameras.

Bruce Lane



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Early Morning Planets Jupiter, Saturn and Mars with Moon Day 2

5:21am April 15 2020

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Better Know a Long Suffering Member of the Tech Committee



Better Know a RASCal is back! Given the changes up at the Hill, as well as the technical issues with the new telescope, I thought it timely to feature a member of the RASC Victoria Tech Committee: Matt Watson. Whether he's streaming our meetings for shut in members, making sure our Centre email system is working, or ensuring the systems at our Victoria Centre Observatory are the envy of many an amateur astronomer, Matt Watson has been one of busiest members, with the majority of his work in the Centre happening behind the scenes.

SkyNews: Your father has also been a member for some time. Was astronomy something you both got involved in doing together or did one of you introduce it to the other.

Matt: We both started attending the Saturday nights at the Centre of the Universe many years ago. Eventually after we kept showing up and spending time with the RASC on site our participation turned into volunteering and manning telescopes for other visitors.

SkyNews: What is your first memory of doing astronomy? (with intent)

Matt: I think the earliest I can remember would be getting up very early in the morning to see a comet. I think it was Hale-Bopp. All I can really remember is how cold it was outside that time of year.

SkyNews: Remembering the old 14" Meade SCT we had up at the VCO, what were the big challenges of working with that telescope?

Matt: The most frequent source of frustration with the 14" was the mirror cell. Across several nights, as the scope was used and slewed to and from either side of the meridian, the apparent center of the field would shift as the mechanical system was not reliably rigid and locked. This led to some very odd outcomes, with auto-guiding off a co-mounted refractor still resulting in observations with a shifting field through the night.

SkyNews: Last year, I covered the term "differential flexure" for the SkyNews' Astronomical Term of the Month column. I was wondering if you'd like to talk about the challenges of aligning the autoguider with the 14" SCT, along with the 5" Refractor.

Matt: In addition to the mirror cell, which didn't appropriately keep the mirror immovable, the effect of using an autoguiding sensor input from a secondary optical path had its own set of problems. Through the observing session, a drift was noticeable in the images being captured, despite each individual frame having an improved tracking result as compared to images taken without autoguiding.

This was a by-product of using a separate optical path which had a slightly different profile of flexure than the 14" in response to tracking across the sky. As the mount followed the imaging target, the two telescope optical paths moved independently, leading to the observed drift in images gathered through the observing session.

SkyNews: While it's not something that we've made proper use of yet, you spent a lot of time and effort getting our observatory capable of doing live broadcasts. What exactly was involved in that process?

Matt: Getting a stable internet connection to the VCO was a challenge. We explored more ambitious options that involved using a transmitter to tie into a high speed connection from downtown, but there were concerns this method would interfere with ongoing experimentation at the HAA (*Ed. Herzberg Astronomy and Astrophysics*). Fortunately, we were provided access to a public network that will provide the necessary speeds for this exciting next step.

SkyNews: Part of being a member of the Tech Committee seems to be dealing with pest control. What have been some of the worst bug issues up on the Hill?

Matt: Oh, this is the best part of the job... Building maintenance and pest control. Since being involved on the Tech Committee we have replaced concrete expansion joints, removed the carpeting and replaced it with pool-deck tiling to address moisture issues, and near-yearly dealt with a lot of wasps and thatcher ants making themselves at home. Now if only I could do something about the mosquitoes. (*Ed. some nights up there, we all do*)

SkyNews: You've spent a lot of time imaging the night sky from the VCO. Is there one favourite astrophotography image, you've done, that stands out in your mind? What are the technical and aesthetic reasons that make this image stand out to you?

Matt: My favourite imaging target must be M81, M82 because there's a great number of other interesting targets in the background which add to the sense of nearness between the galaxies the image implies. Of course, we know how distant they really are from one another, yet in an image you might think otherwise.

SkyNews: It's been a rough patch for the Tech Committee, with regards to the issues that our new telescope has been having, with the latest issue being cut off from the observatory entirely due to the pandemic. Could you sum up the technical difficulties with the new telescope?



Matt: Our expectation of the telescope is that it provides consistent image quality from one side of the sky to another. Through attempting to perfect the collimation we discovered shifts in internal alignment of the mirror assemblies, which ultimately means that collimation can be established but is quickly lost. This is an apparent deficiency in the mirror cell and truss system of our telescope, and we are presently pursuing a warranty repair.

SkyNews: With an eye to the future, when we're all back up on Little Saanich Mountain again, is there one piece of equipment that you'd like to see added to our observatory and why?

Matt: As a bit of a gear-hound it is always tempting to make a long shopping list. In the next few years I would like to see the VCO have a solid set of equipment for imaging off our telescope. We have been making strides in that direction with the acquisition of a high sensitivity guide camera, an off-axis guider optical assembly, and a precision motorized focuser. High on my list is a high sensitivity full frame monochrome camera, making use of the latest low-noise sensor technology, along with a filter wheel and filters. With the 20" obsession scope we have a wonderful instrument for visual observers, but since the QSI camera failed, we haven't had an imaging device available for club use.

SkyNews: Finally, how has being an amateur astronomer made your life better?

Matt: My involvement with the RASC has opened so many doors for me. I got my first real job at Coast Capital Savings thanks in part to my volunteering activities with the RASC. As well, it is very rewarding to be a member of a group with such a wide variety of interests!

SkyNews: Thanks, Matt. I think that we're all (not just the mosquitoes) looking forward to the time when we can go up to the Hill again and make some use of the VCO.



Hercules Star Cluster (M13), artistic image likely caused by cable snag, by Doug MacDonald, April 18th, 2020

Astronomical Term of the Month: Averted Vision

Averted vision is something you hear mentioned a lot in astronomy; including at least once in the first article of this month's *SkyNews*. In essence, it's focusing on using the vision at the edge of your pupil, where your eye has more capability to function in low light conditions, to observe faint, deep space objects. It's something you can do with your naked eye or through optics, like binoculars or telescopes.

It's a rods and cones story of how your eye's retina evolved into its current configuration. Rods are more sensitive to light, but aren't useful for determining colour; while cones are sensitive to colour, but less sensitive to light. The cones are mostly concentrated in the middle of the eye and the rods are more numerous at the edge of your retina. This is why, when you're in low light conditions, it's much more difficult to see colours. What was the evolutionary advantage of this? It probably came down to being the hominid that could see the sabre tooth tiger padding up beside them made that hominid more likely to pass on their genes to the next generation.

Focusing on seeing via the edge of your eye is counter intuitive and a bit like someone trying to tell you that you need to try out a new method of breathing. It's easier for some people than others. Wearing glasses can be a problem, especially with fashion trend favouring smaller sized lenses, over the much larger ones that people wore in the 1980s. Contact lenses can also be an issue. If you've already been wearing your contact lenses all day, the extra wear in the night will be with dry eyes. In exceptionally dark sky conditions, where your retinas have the opportunity to expand more, there's the possibility your contacts won't have enough diameter to cover the edge of your eye properly. It can also be more of a strain on the eye to use averted vision while wearing contact lenses.

You're going to get the most benefit from using averted vision, when observing from a dark place, without a lot of light pollution. You'll have to avoid headlights, screen glare from your devices, and any artificial lighting that isn't dull and red. Having a red flashlight that's still bright enough to direct aircraft for landing at night isn't going to preserve your night vision. So the next time you find yourself out under the night skies, looking for *faint fuzzies*, give this technique a try.

Bruce Lane



In Closing



First of all, a happy 25th birthday to that other, much younger *SkyNews* publication! May looks promising for amateur astronomers, with a number of planetary occultations to look forward to and there was even another meteor shower at the beginning of the month. While SpaceX is largely reviled by the astronomy community these days, for both thoughtlessly and excessively spamming the night sky with overly reflective satellites, they do have a manned launch from the US scheduled for this month; the first time that that's happened in a very long time.

As amateur astronomers we've said good bye to many of the familiar Messier objects of the winter sky and are once again

exploring the summer sky. The weather is more pleasant in the evenings, but the nights grow shorter, as we move towards the Summer Solstice at the end of June. It makes it more important for us to make the most of the clear skies in the nights ahead. For those of you looking for a bit more structured observing, after having been cut off from the RASC observatory and astronomy gatherings, there are a number of observing badges being offered by RASC National, aimed at both beginning and experienced amateur astronomers. There's even a certificate program for astrophotography. There are more details on these programs on the RASC National website.

We're all doing our best to muddle through the new *normal* we've found ourselves in and results may vary, depending on your individual circumstances. With the curve flattening; researchers hard at work on developing treatments; more accurate detectors on the horizon; and governments planning their next course of action, circumstances do seem to be slowly improving. A lot of people are chomping at the bit for things to return to normal; although it's difficult to say just what that *normal* will be like or when. You should take note that after the government banned public gatherings in May of 1918, during the influenza outbreak in the early 20th Century, there wasn't another RASC Victoria meeting until 1919. That said, I think that we can take some comfort from the words of our RASC National President's favourite historical figure: *now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning.*

Bruce Lane: SkyNews Editor



Sun halo, by Rod Miller, April 6th, 2020

Photography Credits

Cover: Venus and the Pleiades, by David Lee; Apr 4, 2020

Page 2: Venus, by Nathan Hellner-Mestelman; Apr 3, 2020

Page 2: Venus and the Pleiades, by Bill Weir; Apr 4, 2020

Page 3: Crop of Bruce Lane (SkyNews Editor) at 2013 RASCal Star Party in Metchosin, by Chris Gainor

Page 3: Crop of Reg Dunkley (RASC Victoria President) at 2018 AGM, by Joe Carr

Page 4: Montage of the Quarter Moon, by John McDonald; Apr 13, 2020. Central image taken with Canon Ra on Williams Optics 105mm refractor. B&W images taken using ZWO ASI120MM-s camera and TV 2.5x Powermate on Williams Optics 105mm. Best 200 of 1000 frames taken with SharpCap, and processed in ACR and Photoshop.

Page 5: Photograph and Design of Astro Cafe Mug, by Joe Carr

Page 5: Posed Book, "*Isaac Newton*", taken at Editor's residence by Bruce Lane; May 11, 2020

Page 6: Hercules Star Cluster (M13), by Doug MacDonald; April 18, 2020

Page 6: Venus crescent, taken over period of Apr18-29, 2020, by John McDonald

Page 7: Early Morning Planets (Jupiter, Saturn, and Mars, with Moon), by David Lee; Apr 15, 2020

Page 7: Matt Watson: crop from 2017 AGM photo taken with an iPhone 6, photographer unknown.

Page 8: Matt Watson (left) and Colin Wyatt (right) at Telescope Making Exhibit for 2005 Astronomy Day at Royal BC Museum, photographer unknown

Page 9: Hercules Star Cluster (M13), artistic image likely caused by cable snag, by Doug MacDonald, April 18th, 2020

Page 10: Eye Blue Eyelashes, image from Pexabay, photographer unknown; uploaded Apr 8, 2015

Page 11: "Brownie" prowling the rose garden, by Bruce Lane; Apr 12, 2020

Page 11: Sun halo, imaged with smartphone camera by Rod Miller, April 6th, 2020

Page 13: Training for Apollo 14. Al Shepard (front) and Ed Mitchell (rear) ride from the suiting room to the altitude chamber, scan by Ed Hengeveld; May 26th, 1970.

Call for Article and Photo Submissions for June Issue

SkyNews is looking for submissions of astronomy photos and articles for the June issue of our Victoria Centre's magazine. Send your submissions to editor@victoria.rasc.ca

RASC Victoria Centre Council 2020

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