Transit of Mercury from Turkey Point, by Nathan Hellner-Mestelman, November 11th, 2019

Transit Strike

The Transit of Mercury brought out a lot of amateur astronomers from the local area, but there was limited access to observing or imaging of the Sun, due to heavy clouds on the West Coast. I had been periodically checking the weather forecasts for a couple weeks and went to bed the night before with pretty low expectations. Given that this astronomy event was happening on Remembrance Day, in less than ideal weather conditions, we didn't do a lot of advertising to the public. Nonetheless, Nathan planned an event out at the Oak Bay Marina, at Turkey Point.

Despite getting up at an unreasonable hour (for someone with astronomy as a hobby) I had to wait until well after the dawn before heading out. It had to be light enough for the chickens to see before letting them out, so I wasn't opening up a buffet to any nearby raccoons. On the drive into Victoria, I could see a sliver of sunlight being crushed by the weight of heavy clouds that dominated the sky. I was originally planning to go to Mount Tolmie, but it didn't look there would be an issue with fog, so I drove out to join the main group of RASCals at Turkey Point. I figured with all the clouds, misery would love company and of course cookies had been promised.

There was a good gathering of RASCals, as well as a couple members of the UVic astronomy club on hand, for the event organized by Nathan. When the sky finally allowed just enough sun through to allow a look it proved difficult for telescope not already focused. The amount of sunlight getting through wasn't enough for anyone using a double stack solar filter and made getting on target difficult without a solar finderscope. After using my Schmidt-Cassegrain telescope to look at Mount Baker, it wasn't properly focused for solar observing and there wasn't enough of a shadow to line up the telescope or for me to know if I was looking at the Sun or false reflection. Alex had similar problems trying to find the Sun with his telescope. Some other telescopes had already been packed up; especially after it looked like it might start raining. Nathan managed to get his telescope on target and focused, so we all had a quick look and Dorothy made a sketch through Nathan's eyepiece.

The RASCals up on Mount Tolmie had a similar experience, as did amateur astronomers around the Island. Like so many times before, we went out with good intentions and equipment, only to be thwarted by clouds. While we weren't able to see very much of the Transit of Mercury, we did manage to get a quick peek at this astronomical wonder and for those of us at Turkey Point at least we enjoyed the cookies.

Bruce Lane

Sid, trying to find some daylight through the clouds, on top of Mount Tolmie, by David Lee; Nov 11th, 2019

Editorial Remarks

November skies are a mixed bag. We had a lot of clear skies, but weren't able to find them for the Transit of Mercury and were clouded out during many of our weekly observing sessions at the Victoria Centre Observatory. For many of us, December will be a time of dreaming of a telescope under the tree or the anticipation of the many social activities with family and friends. We're coming to an end of the year of celebrating the Apollo 11 mission and the often overlooked Apollo 12 mission that followed, but there will be plenty of other 50th anniversaries to celebrate for all the missions that came afterwards.

In this issue of *SkyNews*, we'll have more recaps from our Centre's activities, another essay by Bill Kunze, a look at Christmas in space, 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 December

Neither history nor society is generous to those who come in second place. Buzz Aldrin knows this all too well and I do not believe there is a movie in the works called "The Second Man". A similar fate has fallen on the Apollo 12 mission. I bet most of you would have to refer to Bruce Lane's November *SkyNews* issue to come up with the names of the Apollo 12 crew. I will spare you the effort; Pete Conrad and Alan Bean climbed into the Lunar Module "Intrepid" and landed on an area of the Ocean of Storms on November 19th 1969. Richard Gordon remained aboard Command Module "Yankee Clipper". The 50th anniversary of the Apollo 11 Moon landing was celebrated with great hoopla around the globe. There were a series of special events at the DAO culminating with Dr. Chris Gainor's Moon Walk presentation. In contrast the 50th for Apollo 12 barely received a mention.

Apollo 12, however, is memorable for a number of reasons. First of all it was struck by lightning within a minute of launch and the command module immediately lost its fuel cells and instrumentation. It was the quick thinking of a brilliant NASA engineer and Alan Bean's remarkable memory of an obscure switch which prevented the abortion of the mission.

Apollo 11 was also very nearly aborted during the final descent to the Moon. The relaxed drawl of capsule communicators concealed the alarm that was felt during the last 13 minutes to the Moon. This has been richly captured by an outstanding and immersive BBC podcast https:// www.bbc.co.uk/programmes/w13xttx2/episodes/downloads. Apollo 11 came in too fast and overshot the planned landing area. Neil Armstrong was confronted with rough terrain and had to use up all but 20 seconds of fuel to find a suitable landing spot. In contrast the Apollo 12 mission executed a pinpoint landing and Pete Conrad just had to make a minor intervention at the end to avoid some rubble. They landed within 1000 feet of the Surveyor 3 landing probe. The improvement of the landing accuracy has been attributed to adjusting for local variations in gravity introduced by mountains.

There was concealed drama at the end of the Apollo 12 mission. Remember those lightning strikes? There was concern that they may have damaged the explosive bolts that release the parachutes during the November 24th return to Earth. NASA decided it was better not to share these concerns with the astronauts. They had enough to think about! Even though this was the "second" landing it was a fascinating voyage, rich with history and certainly worthy of celebrating and revisiting. The next 50th anniversary will be in April with Apollo 13 … and there was no shortage of drama on that mission!

For the Victoria Centre Monthly Meeting at 7:30 PM on Wednesday, December 11th we will be changing focus from the solar system to the evolution of galaxies. Visiting Astronomer Dr. Marcin Sawicki will deliver an interesting presentation entitled "*The lives and deaths of galaxies — more than just a metaphor*". We hope you can make it to Room A104 in the Bob Wright Centre.

In the past the Victoria Centre held its Annual General Meeting November. Due to a change in our fiscal year end, this year the AGM will be held on February 22nd 2020 at the Cedar Hill Golf Course. We will be circulating the banquet menu for your consideration in the near future.

Please note that doors to Astro Cafe will be closed on December 23rd and December 30th. I would like to end by wishing all Victoria RASCals a very *Happy Festive Season* and *Useable Skies* in 2020.

Reg Dunkley

RASCals at Turkey Point for the Transit of Mercury, photo by Reg Dunkley; Nov 11th, 2019

On the Shores of Deep Time

The photons of light that fill the eyepiece of my telescope have travelled almost incomprehensibly immense distances. The ancient collective light of a distant galaxy may end up as a faint fuzzy smudge, one that dances in and out of sight at the perceptual limits of vision. The number of light years involved in its transit from the point of origin to Earth is truly awe inspiring. A light year is the distance light travels in the course of one earth year, a rate of 299,792 kilometers (186,282 miles) per second. The Universe has a speed limit. In what other ways might we fathom immense quantities of time? Did I mention that this exploration is a beach story as well, complete with a sea creature? What do the inquiring minds of the early astronomer Edmund Halley, philosopher Immanuel Kant, planetary dynamics, coral fossils, and the Chambered Nautilus have in common? More than meets the eye it would seem. Together, they provide a way of perceiving great expanses of time.

In the 18th century, Edmund Halley (he of comet fame) noted there were discrepancies between the predicted and observed times for solar eclipses. In 1754, Immanuel Kant, the Age of Enlightenment philosopher who had a keen interest in scientific inquiry, correctly deduced that tidal friction was responsible. The gravitational influence of Earth's moon is responsible for the ocean's tides. As waves break on the shores around the Earth, the energy of its rotation is dissipated. This occurs at the rate of 0.00002 of a second per year. Every 50,000 years the length of day becomes one second longer.

Until the 1960's, a full two centuries after Kant's brilliant and wholly original deduction, astronomical observations provided the only proof of this phenomenon. Then a paleontologist, John Wells demonstrated that the fossilized skeletons of certain ancient corals contained annual rings that recorded the passage of days and years. While living, certain species of coral polyp secrete calcium carbonate in fine laminations. This phenomenon was carefully compared with the secretions found in the same type of corral fossils from more distant geological periods. Over millions of years, the average number of laminations within each set of rings increases. In the Devonian Period, about 370 million years ago, there were on average 400 laminations per annual ring. The length of the year was about 400 days with each day 22 hours in long.

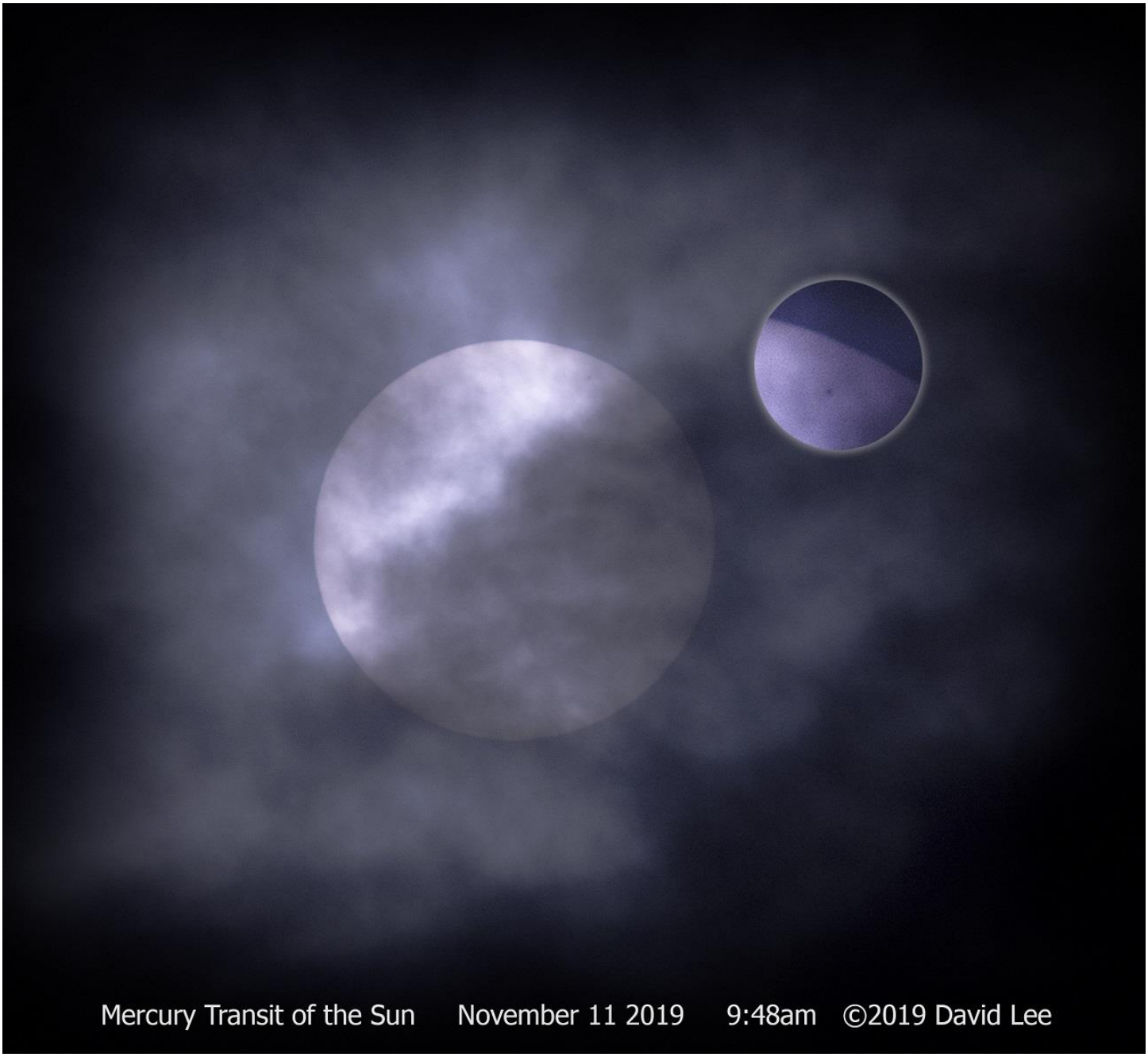
Contrary to popular perception, our construct of time rests on a foundation that is dynamic and not one which is static. Historically speaking, humans have been more inclined to endorse beliefs that are linked to expressions of permanency. Such explanations are simultaneously comforting and reassuring. But as Kant correctly argued, time exists not as a tangible reality but as an internal a priori human construct. Set against measures of deep time, our existence here is, as a specie or individual, the merest blink of an eye. We have, in fact, just arrived on the scene.

The slowing of the Earth's rotation affects its moon. This is where planetary mechanics play a role in our story. Each body revolves around the other with a common center of gravity residing deep within the Earth. This is because the Earth has a greater mass. The angular momentum, the product of the masses and velocities of the two bodies, remains constant. As the Earth's rotation decreases, that of its moon increases, resulting in the gradual but measurable increase in its distance from us.

These phenomena can be demonstrated in yet another way by comparatively examining the fossils, ancient and recent, of the Chambered Nautilus, a shell encased creature related to both the squid and the octopus. As it grows, the Nautilus secretes a new home for itself by laying down a wall or septum between the old and new chambers. Present day Nautilus leave on average 28 fine laminations between each septum; corresponding with the length of the lunar month. Examination of fossilized specimens of Nautilus from progressively older periods reveals a decrease in laminations between the septa. Those from the Ordovician Period, some 420 million years ago, have merely 9-10 laminations. The lunar cycle must have been just 9 or 10 days in length. The Moon would have been much closer to Earth; some 40% of its present distance.

The Laws of Planetary Motion, discovered by Johannes Kepler in the early 17th century, confirm all of this disparate but intimately linked factual evidence. Astronomers can deduce the Moon's distance in the past from its present-day distance, giving us a 10-day lunar month, with the year's length at 417 days. Apparently, the slowing of Earth's rotation at the rate of 0.00002 second per year by the tides truly does make a difference. It is something to ponder, the next time we spend a night gazing at the heavens or when watching the waves break on the shore, while sitting beneath the comforting shade of a palapa contentedly sipping a cold beer or that perfect Margarita.

Bill Kunze



Astro Café: Monday Nights, 7:30-9:00pm

Astro Café is a weekly astronomy gathering for both RASC members and the public alike. It runs on Monday nights, finishing up at the end of May and returning in September. Astro Café is primarily a social gathering, with presentations of recent observing sessions, astronomy gear show and tell, discussions about astronomy, and of course coffee and cookies (please remember to bring a reusable mug…perhaps even a Astro Café mug). It's located at the Fairfield-Gonzales Community Association, in one of the portable classrooms tucked in behind the main administration building, at 1330 Fairfield Road. Astro Café is a nice introduction to the amateur astronomy community of Victoria. The lights will be on and a sandwich board out front to let you know where we are.

For our first Monday, we had a show and tell, with several RASCals bringing astrophotography from the VCO or recent post production work. Joe Carr gave a talk to prepare people for the upcoming Transit of Mercury and Chris Purse continued his series of Handbook 101. After a break for Remembrance Day, Astro Café returned with Dorothy Paul giving a talk, titled: *New insights into the Life Histories of Open Clusters revealed by Gaia and the MM Telescope*. Chris Purse gave another Handbook 101 lesson and the Centre's harvest of astrophotography, from the Transit of Mercury, was displayed (along with some transit themed cookies). Astro Café closed out the month with a buy and sell night.

Bruce Lane

Monthly Meeting Speaker: Dr. Marcin Siwicki

7:30 PM, Wednesday, December 11th; 2019 in Room A104, Bob Wright Centre, University of Victoria

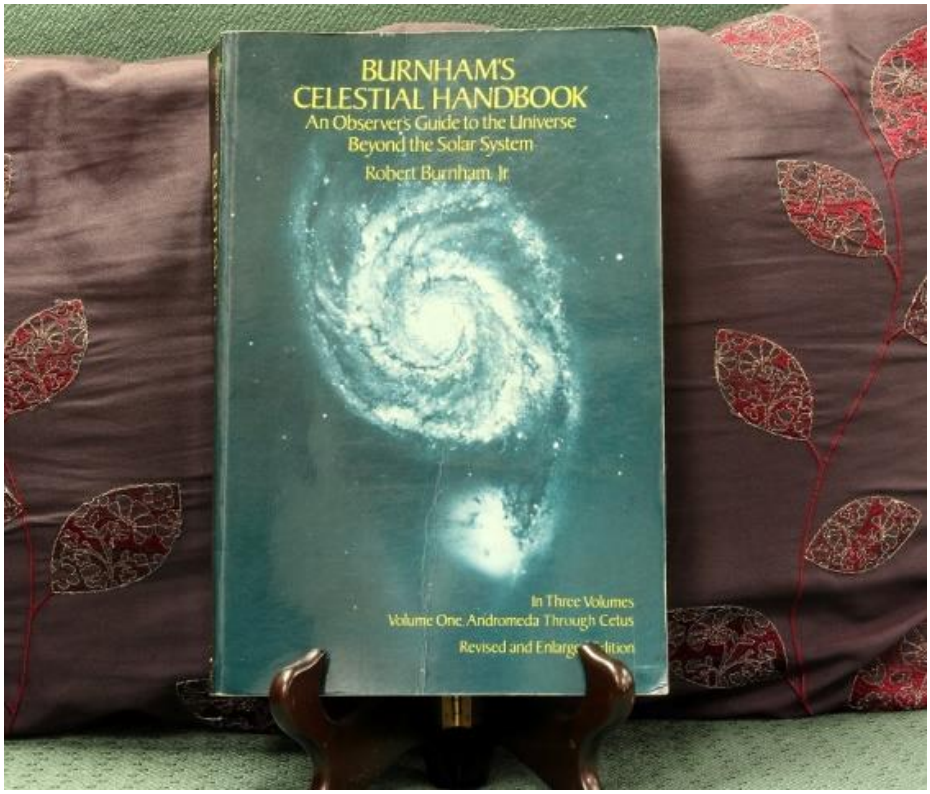
Astronomers often say that galaxies were "born" soon after the Big Bang, that they "live" while they are forming new stars, and that they "die" when they turn into quiescent "red and dead" ellipticals. Surely, these biological terms are just an interesting metaphor, aren't they? No! It turns out that there is a deep connection between the pathways galaxies take through time and those that we humans take through our life cycles. In this talk I will show you how the fates of these two very different populations – galaxies and people – are connected at an underlying, fundamental level that lets us better understand the one by understanding the other.

Dr. Marcin Sawicki is an observational astronomer who studies how galaxies form and evolve over cosmic time. He is especially fond of very large samples of galaxies that span multiple epochs, and uses data from ground-based telescopes such as CFHT, Gemini, and Subaru, as well as space-based observatories such as HST, Spitzer, and (soon) JWST. He is the Canada Research Chair in Astronomy; a Professor of Astronomy and Physics at Saint Mary's University in Halifax; and is currently visiting NRC-Herzberg in Victoria while on sabbatical leave.

Reg Dunkley

From the Library

After our monthly meeting, feel free to join your fellow RASCals socializing up in the astronomy faculty lounge on the 4th floor of the Elliott Building, where we have coffee, juice, and cookies. It's also where the RASC Victoria Library is housed, with 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. Every month, *SkyNews* will be featuring a new selection from our Centre's library, complete with a brief book review.



This month we're taking a closer look at ***Burnham's Celestial Handbook***, the three volume observer's reference written by Robert Burnham Jr. As we learned, when trying to award it as a door prize for the 2018 RAASC Victoria Star Party, this is a work owned and treasured by many members of the amateur and professional astronomy community. Burnham started out as an amateur astronomer, both a skilled observer and comet hunter. After discovering a couple of comets and work on his detailed night sky survey was well underway when he was offered a job at the Lowell Observatory. During his 22 years employed by the Lowell Observatory, he worked on his Celestial Handbook, which he was finally published by Dover Publications, after being rejected by numerous publishing houses and even by the Lowell Observatory. There was even some resentment by staff members that he was using observatory resources for his literary project. He was fired from the Lowell Observatory, because they didn't have a project for him and he refused a janitorial job, marking the beginning of his downward spiral into poverty. He spent his later years in poor health and homeless, with the astronomy community not even knowing he had died until years afterwards. His urn was buried - with a misspelled name - at a military cemetery, due to his service in the US Air Force during the Korean War.

The three volumes of Burnham's Celestial Handbook are filled with detailed observations and extensive notes about deep space objects. It's long been a literary standard for astronomers and is available at our Victoria Centre Library.

Bruce Lane

Hill and Dale (Observing on the Island)

Other than the early morning spent waiting for the few seconds we were able to see the Transit of Mercury, there were some very good opportunities for stargazing in November. David Lee spent a few cold nights and mornings, fighting the weather to get some images of the occultations of Venus and Jupiter. The first weekly observing session of the month had a good turnout. There was an attempt to put a finderscope on the 16" Ritchey-Chretien telescope, but it the bracket wouldn't hold it properly in place. It is also probable that the Ritchey-Chretien telescope has a collimation error, as the dual diffraction spikes on stars, found in recent astrophotography samples from the 16", are believed to be the result of astigmatism. The Technical Committee are confident that they can fix this issue without having to purchase additional equipment. The good news is that our 20" Obsession Dobsonian reflector will soon be getting a digital setting circle accessory, to make it a bit more user friendly - especially for those of us twisting around to line things up while at the top of a ladder.

A reminder that although the VCO belongs to and is for the use of the members of the RASC Victoria Centre, with both weekly scheduled and unscheduled sessions run by our MiCs (Members in Charge), it is located on National Research Council property. This means that all visitors to our observatory must be on our observer list and registered with the NRC. To get on the list, just contact Chris Purse (Membership Coordinator) *membership@rasc.victoria.ca* and we'll see you up there on the Hill some night soon.

Bruce Lane

Silent Night

After their launch on December 21st, 1968, the Apollo 8 astronauts would never have the fame that the Apollo 11 astronauts would, but this mission would have a lot of firsts. It was the first time a crewed mission was launched on top of a Saturn V rocket; the first time humans would travel to the Moon; and it was also the first time Christmas would be celebrated in space. The original mission plan included using the lander module, but it wasn't ready in time for launch. Astronauts James Lovell, Frank Borman, and William Anders would orbit the Moon together in the command module on the most ambitious navigation missions since the days of Magellan.

After some nervous moments passing through the Van Allen Belts, the Apollo 8 mission spent three days making its way to the Moon. As navigator, James Lovell used a sextant to plot the course of the spacecraft, as an emergency backup for the navigation work done by mission control, in the event that they lost communications. Soon after achieving lunar orbit, they became the first humans to witness earthrise from another world, with William Anders scrambling to change the camera from black and white to colour film to take an unplanned picture that captivated the world. They made ten orbits of the Moon, celebrating both Christmas Eve and Christmas Day with live broadcasts to Earth that included readings from Genesis. For Christmas Dinner they had chicken with gravy, corn chowder, and some sugar cookies that they washed down with hot chocolate and orange juice. It prompted William Anders to utter the immortal words: "*I hope you all had better Christmas dinners today than this*."

Christmas has come a long way in space. Astronauts aboard the International Space Station can now expect a much nicer dinner, the exchange of gifts, and even get to make calls home to their family. When David Saint-Jacques (Canadian Space Agency) celebrated Christmas last year aboard the ISS, the crew were playing Elf on a Shelf, taking turns hiding a small doll around the space station.

Not all efforts to celebrate Christmas in space were celebrated by NASA. The astronauts of the Skylab 4 mission made a Christmas tree out of empty food cans in 1973 and were criticized by mission control for wasting valuable mission time. They had been putting in 16 hour shifts for 85 days and were still falling behind schedule. Their main problem was that the mission planners were basing their schedule on the pace set by the Skylab 3 crew towards the end of their mission and not on their early days of acclimation, resulting in the Skylab 4 crew being behind schedule the moment they suited up. After being made to work through their meals and rest time, with ground control constantly barking at them over the radio, the crew finally turned off all their communications with Earth for 16 hours on December 28th.

Bruce Lane

Astronomical Term of the Month: Ephemeris

An Ephemeris is a timetable that has celestial coordinates to indicate where a planet, comet, or other object is in movement using the stars in the night sky as a map. Whether you're determining the position of a known comet or asteroid, or charting a newly discovered object, it's essential for future astronomers to have an ephemeris to be able to find it.

Bruce Lane

Transit of Mercury sketch by Bill Weir

November Crossword Answers

Across 2: NICER is the name of the telescope that recently detected record setting X-Ray burst; **Across 5**: Libra is the constellation that the Sun was rising in front of during the Transit of Mercury; **Across 6: Fireworks Galaxy** was a recent target from Plaskett Telescope imaging session; and **Across 8: Kepler** is the name of a famous German astronomer.

Down 1: Curiosity is a currently operational rover on Mars; **Down 3:** A **Coronagraph** is the Primary instrument used by Walter Roberts at Climax Observatory; **Down 4: Thirteen** years until the next Transit of Mercury (provided you're willing to travel to see it); **Down 7:** Tycho Brante once lost a duel with a fellow mathematician by **a nose**.

In Closing

The Geminid meteor shower will be at its peak later this week. While being every bit as spectacular as the Perseid meteor shower, the Geminids never seems to get as much attention. Maybe it's because people are less likely to want to lie out on a field to watch the night sky, if that field is cold and wet. Victoria's weather is usually less than accommodating this time of year and just to make it a bit more challenging, this year's annual meteor shower occurs during a very bright phase of the Moon. There will still be lots of meteors, but even if the skies are clear, the brightness of the Moon means that you'll only see the largest of them. The current forecast suggests the skies will not be clear.

As we face the Holidays, we reach a divide in the amateur astronomy community and in ourselves. We take delight in the very displays of light pollution we shook a fist at weeks earlier. The crisp night sky calls us, but so does the warmth of the hearth. What is often a solitary hobby is interrupted by the demands of friends and family over the holidays. We finally have the long nights we pined for in the summer, but it's a bit too cold outside for a lot of us to want to be outside in. That and the weather in the winter can be a bit on the cloudy side here in Victoria. December has had mild temperatures to start the month off, but the skies have been less than ideal for astronomy. The jokes about what the weather is like after you buy a new telescope are finding a lot of traction lately. Colder and darker days are ahead, but so is Christmas and New Year's!

Bruce Lane: SkyNews Editor

Photography Credits

Cover: Transit of Mercury, by NathanHellner-Mestelman, from Turkey Point, on November 11th, 2019

Page 2: Transit of Mercury cookies, taken at Astro Café, November 18th, 2019

Page 2: Sid trying to find some daylight through the clouds on Mount Tolmie, by David Lee, Nov 11th, 2019

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: Assembled RASCals at Turkey Point for Transit of Mercury, by Reg Dunkley; Nov 11th, 2019

Page 5: Crop of Bill Kunze and Dob, August 2019, by Patricia Horlor.

Page 6: Mercury Transit of the Sun, by David Lee; Nov 11th, 2019

Page 7: Photograph and Design of Astro Cafe Mug, by Joe Carr

Page 8: Posed Book, "*Burnham's Celestial Handbook*", taken in UVic Astronomy Teacher's Lounge, by Bruce Lane, March 13th, 2019

Page 9: Jupiter, Venus, and Crescent Moon, by David Lee, Nov 28th, 2019

Page 10: Earthrise on Christmas Eve, by William Anders aboard Apollo 11 mission; December 24th, 1968; courtesy of NASA

Page 11: Sketch of Transit of Mercury by Bill Weir, Nov 11th, 2019

Page 12: Handfeeding Chickens, by Bruce Lane; July 10th, 2019

Page 13: Don Blair's Neil Armstrong playing Ukulele photo taken onboard USS Hornet, July 24th, 1969. Scan courtesy of Jody Russell/NASA Johnson Space Center.

Call for Article and Photo Submissions for January Issue

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

RASC Victoria Centre Council 2019

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UVic Liaison	Alex Schmid	
Observing	David Lee	Li-Ann Skibo
	Dan Posey	John McDonald

One of my favourite Apollo 11 mission pictures: Neil Armstrong playing the Ukulele while in quarantine