

SKYNEWS



A Few Days in June: Preparing for the RASC National Assembly

I'm flying off in a few days, with several other Victoria Centre members, to the other Centre of the Universe (AKA Toronto) to attend the 2019 RASC General Assembly. Did you know that it has been five years since Victoria hosted the General Assembly, for the 100th Anniversary of our Centre? We spent close to two years planning, attending meetings, preparing lists, and worrying about every little detail. There were so many volunteers who helped and I still marvel at the work of our two chairpersons: Mark Bohlman and Paul Schumaker. One has to wonder, however, about what we put them through as Mark fled to the States (for his new job) and Paul took on a full time Anglican minister position. But it was a fantastic GA.



Where else could you have been where both the Queen and Darth Vader appeared on the same evening? Even Toronto won't have a chance of beating that.

The GA is being hosted by the Toronto Centre, with help from the Mississauga Centre and the National Office, in conjunction with the AAVSO (American Association of Variable Star Observers). It will be held at York University, from June 13th to 16th. The theme of this year's General Assembly is Education and Public Outreach, and to incorporate this completely, there will be two streams: conference events (for RASC and AAVSO members) and events open to the general public. It will be a very busy few days.

There will be the usual meetings for the Board of Directors on Thursday, June 13th. We need to congratulate Chris Gainor, from our Centre, who has been elected as National President for another year and will be the chair for these sessions. The National Council will also meet; with Nelson Walker as our representative there. These should be rather "interesting" gatherings, with both financial and policy considerations to be debated and voted upon. Stay tuned. A wine and cheese tasting

may soothe some souls later in the evening, as well as observing with the new telescope at York University.

Friday is a full day, with invited speakers from Canada and the United States presenting on a variety of topics, ranging from new space missions and planetary atmospheres, to education. Public outreach offerings include the work being done at Zooniverse. This evening will feature the launch of David Levy's new book: "A Nightwatchman's Journey".

On Saturday, both the RASC and AAVSO members will give short presentations in concurrent sessions. The public events will also take place all day, in a nearby venue, with many different science-based groups and STEM related activities keeping children and families both educated and entertained. The biggest challenge will be how to take in all the different sessions and activities that will be offered. In the evening, author James R. Hansen will present the Ruth Northcott Lecture, about his book: "First Man", the authorized biography of Neil Armstrong in honour of the 50th Anniversary of the first Moon Walk.

The last day of the conference will have the Annual General Meeting of the RASC in the morning and several major sessions in the afternoon, focusing on both educational outreach to the centres and outreach to the public. The concurrent public events continue on this Father's Day as well. The banquet will be held in the evening, with John Percy of York University as the speaker, and awards handed out. Thanks to everyone who had a hand in nominating me for one of the Service Awards. Hopefully, I won't trip on my way up to receive it. I will wave the Victoria flag for us all.

To round out the conference, on Monday morning, participants will be visiting the David Dunlap Observatory, north of Toronto. This observatory was designed and built after Victoria's own Dominion Astrophysics Observatory. It will be very interesting to see the similarities and how they are running the programming there. When we return from our eastern adventures, Victoria attendees will give you some updates from the National meetings and scientific presentations. But have no fear; even though we look forward to going to the General Assembly of the RASC in Toronto, we won't be putting our hands up to host another GA in Victoria for many years to come.

Laurie Roche

Editorial Remarks



With a number of RASCals making plans to head off to Toronto, for the RASC National Assembly, most of us will still be here trying to do some astronomy during the longer days and later nights of Daylight Saving's Time. As we move closer to the longest day of the year, it's a good time to think about focusing on the Moon and Sun, do some reading, or maybe pay attention to some of those neglected chores around the homestead. I hear RASC has an *Explore the Moon* badge for observers.

By mid-June, some amateur astronomers even call a halt to all activity and take a couple weeks off from their hobby, until they're at least a week or two on the other side of the dreaded Summer Solstice. As one of the two people scheduled to run the Victoria Centre Observatory observing session on the *night* of the Summer Solstice, it's not a luxury I have. We'll probably run a solar observing event at the VCO that night, with an earlier than usual start time, if the weather cooperates and there's any sunspot activity.

In this issue of *SkyNews*, we have an interview with Jim Hesser, another in our series of historical articles on aperture fever, 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 June

The final Astro Cafe of the season ended in fine form on Monday, May 27th with an epic cookie fest. Astro cookie architect Diane Bell kindly brought tasty replicas of the M87 Black Hole. Meanwhile there were concerns that the emergency biscuit stockpile may not fare well over the summer break, so RASCals rallied to the challenge and by evenings end there was not a Viva Puff to be found. Thanks must go to Astro Cafe hosts Barbara and Kurt Lane, John McDonald, and Chris Purse for maintaining such a welcoming and informal tone to the gatherings. This has encouraged attendees of all ages to showcase their stunning images and projects, demonstrate techniques and gear, ask and answer questions, discuss breaking news, and share their enthusiasm and passion for all things astronomical. Thanks must also go to the presenters who made these evenings so informative and entertaining. If you have not made it to an Astro Cafe yet, the doors will re-open again at 7:30 PM on Monday, September 9th in the Portable at Fairfield Community Centre ... and oh yes ... please bring a reusable mug.



We still have one more monthly meeting to go before the summer intermission. On Wednesday, June 12th, science journalist Matt Williams will give a talk on interstellar exploration. With the growing alarm about global warming, the search for exoplanets seems to have morphed into a "house hunting" mission. Even if we identify a suitable new planet, can we get there? Matt will explore the challenges involved and assess the feasibility. Maybe it will be easier to take better care of our home planet.

While many organizations take a break over the summer, Victoria Centre RASCals will remain in high gear. Observing sessions are scheduled at the Victoria Centre Observatory every Friday evening. If you have not yet peered through our recently commissioned, Obsession 20 Inch Dobsonian you are in for a treat. In order to participate in the weekly observing sessions you must be a member of the Active Observers list. Send an e-mail to membership@victoria.rasc.ca for details.

We will continue to co-host Saturday Star Parties at the Dominion Astrophysical Observatory with our “cousins”, the Friends of the DAO. A record 22 Star Parties will have been held by the time this program winds down on September 7th. The combination of Plaskett tours, astronomical lectures, planetarium shows, and night sky viewing through RASCAL scopes makes these evenings unusually rich, public outreach offerings. We have recently redeployed our old 20 Inch Walton Dobsonian to the Centre of the Universe. When we roll this scope onto the adjacent patio it will help boost views of the planets during the twilight zone around the solstice and reveal deep sky objects when darker skies return near summer’s end. If you would like to become more engaged in the Victoria Centre we are still looking for volunteers. Perhaps you would like to help Martin Caldwell operate the 20 inch Walton Dob or “person” our Welcome Desk. Maybe you have a short presentation you would like to deliver in the Black Hole Theatre. Please email me at president@victoria.rasc.ca if you would like to contribute.

A number of events celebrating the 50th anniversary of the Apollo Moon landing are still in the planning stage, both on and off Observatory Hill. Announcements will be emailed when details are finalized. Be sure to read Chris Gainor’s excellent article about the Canadian contribution to the Apollo mission in the July-August issue of the Sky News Magazine (*Ed: the other SkyNews*).

In the longer term, be aware that the Victoria Centre plans to set up outreach tables at both the Saanich Fair on Labour Day Weekend and at the Fairfield Fall Fair on Sept 21st. Our Victoria Centre Star Party will take place at St Stephens Anglican Churchyard, between September 27th and the 29th. Be sure to guard those dates. It is shaping up to be an action packed summer. Enjoy!

Cloud Free Nights

Reg Dunkley

Astro Café: Monday Nights, 7:30-9:00pm (Returns in September)



Astro Café is a weekly astronomy gathering, for both RASC members and the public alike, each Monday night. 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 an Astro Café mug). These gatherings are located at the Fairfield-Gonzales Community Association, in one of the portable classrooms tucked in behind the main administration building, at 1330 Fairfield Road.

It was another month filled with presentations and short lectures at Astro Café. Chris Purse continued his series on Handbook 101, focused on sections of the Observer’s Handbook, with a closer look at binoculars. This month, Janeane MacGillvray paid us a visit from Nanaimo, to give a presentation on her experiences doing public astronomy public outreach in Hawaii. Ken Atkinson gave a talk on occultations and Nathan brought a

comic book that he made about the solar system. On the last Astro Café of the month and of the season, Dorothy and Miles Paul gave a presentation about their observations and sketches, during their trips to the White Mountains. Randy gave a short lecture on the famous Deep Hubble Field image and Diane Bell brought some cookies that were inspired by the black hole image that was taken with the Event Horizon Telescope. May 27th marked the end of Astro Café, until it resumes again on September 9th. A big thankyou to the people for hosting our weekly meeting of Victoria RASCals and ensuring a steady supply of cookies: John McDonald, Barbara and Kurt Lane, and Chris Purse.

Bruce Lane

Monthly Meeting Speaker: Matthew Williams

Going Interstellar: When and How Will We Travel to the Nearest Stars?

7:30 PM, Wednesday, June 12th; 2019 in Room A104, Bob Wright Centre, University of Victoria

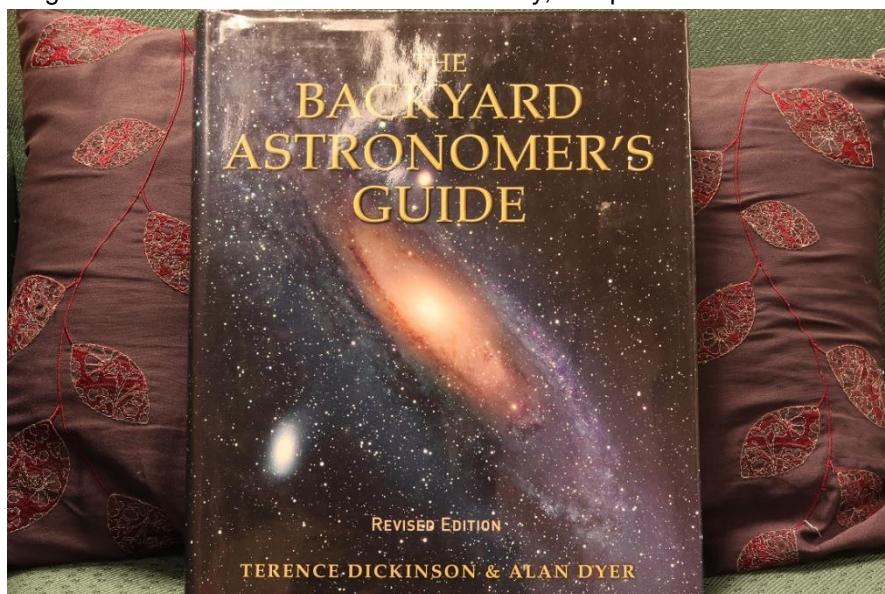
The dream of traveling to the nearest stars is one that has haunted the public imagination for centuries. But it has only been in the past few decades that we have been able to contemplate what such a journey would look like. And in recent years, the desire to send missions to neighboring planets – and also neighboring stars – has re-emerged with a vengeance. There are many reasons for this: the Voyager 1 and 2 probes recently joined each other in interstellar space; the discovery of exoplanets (including one next door) has inspired scientists to look for life on them directly; and emerging technology has been making space travel cheaper and more accessible. But how (and when) will we “go interstellar”? As with most things having to do with space exploration, the simplest answers are: “How fast do we need to get there?” and “How much are we willing to spend?”

Matthew S. Williams is a professional writer for Universe Today and Interesting Engineering. His articles have been featured in Phys.org, HeroX, Popular Mechanics, Business Insider, Gizmodo and IO9, Science Alert, Knowridge Science Report, and Real Clear Science, with topics ranging from astronomy and Earth sciences to technological advances, environmental issues, and the search for extra-terrestrial intelligence (SETI). He is a former teacher, a science-fiction author, and a 5th degree Black Belt Tae Kwon-Do instructor. He lives on Vancouver Island with his wife and family.

Reg Dunkley

From the Library

After our monthly meeting, feel free to join your fellow RASCals socializing in the astronomy faculty lounge up 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 the RASC Victoria Librarian: Diane Bell. Our library covers the many facets 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 **The Backyard Astronomers Guide**, by **Terence Dickinson and Alan Dyer**. Dickinson is the author of another well-read book on the subject, *NightWatch*, which was the first book we reviewed in this segment and in many ways the book we're now reviewing is its sequel. Alan Dyer is also a noted astronomy writer himself, *SkyNews* editor (*the other one*), and astrophotographer. Dyer is likely responsible for this book having a lot

of content in it about astrophotography. I preferred *NightWatch* for its focus and inclusion of detailed, night sky, observing charts, but appreciated that in this volume they tackled astrophotography and a few other subjects in more depth. It's definitely more gear orientated than *NightWatch* was. It's worth a read for amateur astronomers, especially those new to the hobby, and most importantly it's a book available at the RASC Victoria Centre Library.

Bruce Lane

Hill and Dale (Observing on the Island)

The first weekly observing session of the month, for the Victoria Centre Observatory, was marred by clouds, and soon turned into a social on Little Saanich Mountain. The next week was much better, with 11 RASCals taking part in observing the Moon and a number of Messier objects (M3, M13, M51, M57, M63, M81, M82, M97, M106, and M108) with the 20" Obsession Dobsonian reflector telescope. Mike and Clayton also spent time imaging the night sky with their equipment. On the third Friday, clouds once again thwarted us at the VCO, which was a shame; because we would have had the opportunity to witness five good passes by the International Space Station that evening. For the last evening of the month, the weather conditions were very good and it was on the night of a new moon. Unfortunately, it wasn't until 11pm that Joe, Remi, Diane, and Nelson were able to do much in the way of observing, owing to the shorter hours of darkness this time of year. The 16" Ritchey-Chretien telescope remains out of commission, owing to the combined computer and telescope failures suffered last winter. Members of the technical committee have been holding meetings and spent a lot of hours of their own time working on this and hopefully we'll be back to using our other new telescope before long.



A reminder that 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). Because it is located on NRC property, all visitors to our observatory must be on our observer list. 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

More Aperture Fever

First light on the Hooker Telescope was still a fresh memory when George Hale stepped down as the director of the Mount Wilson Observatory in 1923; with Walter Adams becoming the second director of the new observatory. Afterwards, the semi-retired Hale spent his time working in the observatory's solar laboratory, in addition to submitting articles to be published in magazines and scientific journals. It really looked as though George Hale's telescope building days were now behind him for good. But after only a few years of being freed from the stress of management, he began dreaming of building an even bigger telescope than the 100" reflector telescope on Mount Wilson. He was adamant about building a 5.1 meter (200") aperture telescope, despite his bouts of mental illness and a permanently fractured relationship with the one of the greatest opticians of his age. Was he still inspired by childhood visions of the monstrous telescope of Jules Verne's *From Earth to the Moon* or was he spurred on by competition from other observatories? It could just be that Hale felt that he had one big project left in him and he wanted it to be a telescope that would stand as the largest in the world for many years after it was built.

The one advantage George Hale had over other administrators was that more than just being an experienced astronomer, he used his high society upbringing to become one of the best fundraisers the scientific community had ever seen. The discoveries made using the Hooker Telescope were significant, as were the strong personalities that made them, and they were exploited to market the building of an even larger telescope. If these discoveries were made possible by the 100" mirror, imagine what was possible with a 200" aperture telescope! When Hale was healthy, he was manically driven to complete the projects he took on, but the longer the project went on the more likely he would be sidelined by his mental breakdowns. In 1928, Hale managed to secure a grant, from what would later be known as the Rockefeller Foundation, for six million dollars. George Hale was fully aware that a grant of this size could bring the wrong kind of attention, both from shady vendors and merciless critics, so he kept the amount of the grant a secret. When the stock markets crashed the very next year, he was glad he had not publicized the amount of the substantial grant, given that it was at a time when so many Americans were suddenly reduced to abject poverty. With the full horror of the Great Depression soon becoming evident, Hale also realized that this new project could be the last giant telescope to be built for a very long time.

George Ritchey, the master optician responsible for building most of the telescopes on Mount Wilson, including the shaping of the mirror for the Hooker Telescope, had grand plans for building telescopes to rival the one's he had built for Hale. Unfortunately, Ritchey's career as a telescope builder all but ended after being fired from his work in Paris. Someone had left a window open during the shaping of an enormous mirror, when it was vulnerable to sudden changes in temperature, causing it to be ruined. Ritchey was unable to return home to work at an American observatory, because his bitter feud with George Hale and Walter Adams on Mount Wilson resulted in him being blacklisted from getting any astronomy jobs in the United States. This vendetta by Hale and Adams extended to blocking Ritchey from being published in American scientific journals and magazines. The only places Ritchey could have his writings about optics printed were in Canada and France. Ritchey's first article in Canada was published in May of 1928, in the *Journal of the Astronomical Society of Canada*. In that first article, he described his plans to build a 5 meter aperture telescope system of multiple, moving mirrors, allowing the operator to change the focal length of the telescope; so that the system could be made to conform to the subject the astronomer was interested in observing. He was never able to find a financial backer for his innovative, fixed supertelescope design. Ritchey also pleaded for the builders of future telescopes to not let themselves be limited by the current designs found in observatory telescopes. For the construction of the largest telescope in the world, one of the most talented telescope designers of his time would be sidelined by pettiness, fueled by class warfare and insanity.



The conventional wisdom of the time, including the opinion of the Bureau of Standards, was that the construction of a 200" telescope mirror was impossible. Given the problems that the Saint-Gobain glassmakers in France had making the 100" mirror blank, without making use of new innovations in optics, the critics would very likely be proved correct. Decades earlier, Elihu Thomson had invented a process of using extremely high heat to make quartz disks. He was convinced that they would also make excellent reflector mirror disks, being less subject to changes in temperature than plate glass. After making a set of quartz mirror blanks for the Snow Solar Telescope on Mount Wilson, Hale was so impressed that he later commissioned Thomson to build the 200" mirror for his next big telescope. No stranger to astronomy, Thomson had been grinding his own mirrors and building his own telescopes since 1878, including the construction of a 10" aperture refractor, complete with a clock drive for its mount. He made his first contribution to optics at the age of 13, using a small furnace to make a glass droplet microscope lens, and published numerous papers on his work as an amateur optician. Thomson was an

avid observer and among the small minority of his time for his opinion that sunspots were linked to the northern lights. He was also fascinated by Mars and while he dismissed Percival Lowell's interpretation of the lines on Mars as being canals, his own interpretation of them being paths, through heavy vegetation, made by migrating animal herds hasn't stood up to the test of time very well either.

Elihu Thomson was better known one of the most prolific geniuses among the electrical pioneers in America. He was responsible for nearly 700 patents, with inventions that included the arc-lighting system, the magnetic lightning arrestor, a continuous cream separator (forerunner of the centrifuge), a fluid press steam engine, and an automatically regulated three-coil dynamo. After merging the Thomson-Houston Electric Company with Thomas Edison's company, to found General Electric, Thomson insisted that his current research laboratory in Lynn, Massachusetts be GE's primary research laboratory. Edison established a second laboratory, Menlo Park in California, but compared to the generous working conditions and comradery of Thomson's lab, Edison's lab was a gulag and was also lacking in professionalism in the work done there. Thomson turned down a series of administrative jobs (including Managing Director of GE) to focus on his work at his research laboratory. He was first and foremost a problem solver; the kind of engineer who was used to creating new inventions to solve the problems of something else he had just invented. When he was hired by George Hale, to build a 200" aperture mirror, Elihu Thomson had already amassed an impressive body of work in his field, with all the awards and honorary degrees that came with it, all while still finding the time to lecture at Harvard University.

At the General Electric laboratory, Thomson succeeded in building larger and larger quartz mirrors, but no sooner had he dealt with one problem, he quickly discovered new technical problems that came with increasing the aperture. The high heat required to make the quartz blanks made a lot of bubbles. Even using vacuum pumps, it proved difficult to remove all the bubbles from the molten, quartz blanks. He hit the most stubborn limit to aperture, when he tried to make a 60" diameter, quartz mirror. The budget for the project ballooned to \$600 000 (10% of the entire telescope budget and over twice what was originally allocated for the mirror) forcing George Hale to call a halt to work to what was becoming a sandbox project. Many of the smaller, quartz mirrors, made by Thomson, found their way into other telescopes, but sadly one of the great inventors of his time was unable to meet the challenge of creating Hale's new mirror. Some of Thomson's ideas, like the counterweight lever arms being in gimbals, found their way into the final telescope design at Palomar.

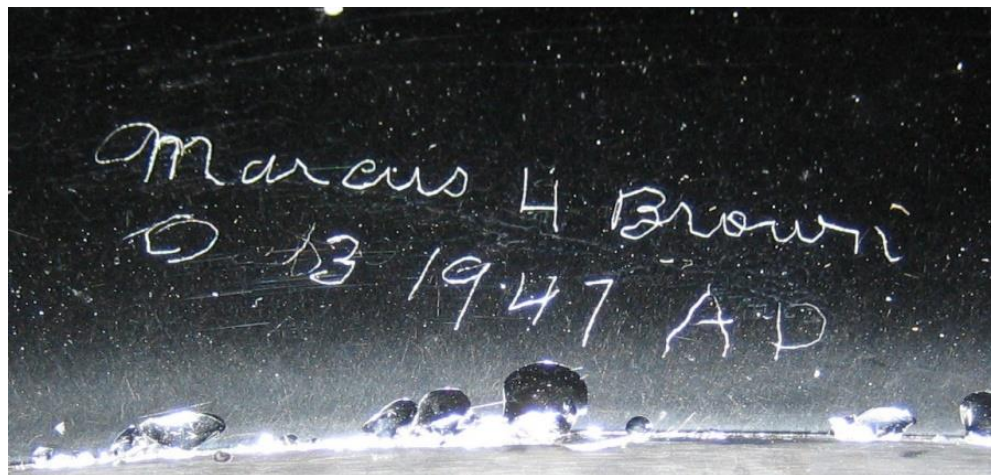
For nearly two decades, Corning Glass Works was moulding laboratory glassware and cookware out of a borosilicate glass they trademarked as Pyrex. George Hale approached the glassware company and they agreed to push the limits of the possible. George Hale hoped that by making a mirror out of borosilicate glass the chance of success would be increased by being less vulnerable to temperature changes than plate glass. The engineer and physicist in charge of Corning's special projects division was George McCauley. The mould resembled a honeycombed waffle and giant ladles were built to dish out 75 tons of molten Pyrex. Disaster struck during the process, when one of the "honeycomb" cells broke loose and floated to the surface, soon followed by several others. The first mirror was ruined, but instead of throwing the mirror out, McCauley decided to stress test it in the specially designed, annealing oven, built to cool the enormous mirror blank.

McCauley's team tried again, later that same year, but this time cooling systems were installed for each individual cell. On December 2nd of 1934, Corning Glass Works successfully made the largest piece of glass the world had ever seen. The 200" mirror blank then went into the annealing oven, to slowly cool down over the course of the next ten months, and it very nearly didn't survive. During a flood, a nearby dyke burst and the building that housed the mirror came perilously close to being destroyed. As it was, the annealing oven lost power for three days, causing McCauley no small amount stress over its fate. Upon inspection, the 5.1 meter mirror blank had survived its ordeal by both fire and flood.

Once it was properly cooled down, the colossal mirror blank was crated up and shipped by train, from Upstate New York to California, in the spring of 1936. Crowds of onlookers lined the track to watch the telescope mirror blank slowly roll on by. Schools were closed early so students could watch the train pass through their towns. For Pyrex, it was a rolling billboard, thanks to the very large labeling on the exposed crate, on the specially made well car, that read: "Pyrex 200" Telescope Disc made by Corning Glass Works Company NY". The letters that spelled "Pyrex", crowning the rounded crate, were nearly as tall as the curious onlookers. Because the train never moved at night and it's slow pace, necessitated by its fragile and expensive cargo, viewers had more time and opportunity to have a look at the future of astronomy in a scene that was repeated in town after town, across America.



After the mirror blank was delivered to the Caltech optics lab in Pasadena, it spent the next eleven years being shaped by a team of opticians, led by Marcus Brown. One of the problems they had to overcome was an astigmatism that couldn't be corrected by grinding the glass. After months of work, they figured out that the supports were squeezing the mirror too hard and once the supports were corrected they were able to remove the astigmatism. It was another case of problems occurring from the sheer scale that they were working with. When work on the massive mirror was finally completed, Marcus Brown scratched his signature on the inside edge, just like any other artist would (seen below). The same year that work on the mirror was finally finished, George McCauley retired from Corning Glass Works. McCauley would later be dragged out of retirement in 1959 to oversee the making of an 84" mirror for the Keck Observatory in Hawaii. If you own a reflector telescope today, the mirror is very likely made of Pyrex. Even among those few still grinding their own mirrors, Pyrex is more likely to be used. This is partly because of the availability of Pyrex blanks, although there are still some who prefer plate glass, and even a few who use quartz glass.





The design of the 5.1 meter (200") telescope was as important as the mirror itself. It would have to house the 14.5 ton mirror and the problems that initially plagued the 100" telescope design at Mount Wilson would be that much more problematic with a telescope twice its size. Russell Porter (*seen left, drawing*) seemed more like a character from a Louis L'Amour novel than a typical telescope designer. As a young man, Porter attended a lecture about Greenland, given by the infamous explorer, Robert Peary, and came away from the experience with an incurable case of Arctic fever. Given how difficult it can be to work with compasses in the Arctic, Porter acquired most of his early astronomy knowledge using the stars for navigation. He completed a large collection of expertly drawn sketches of the land and its people, but never made it to the North Pole. He also took part in a failed expedition to climb Mt McKinley. With the route up the mountain blocked, Porter took part of the group and did a topographical survey of the mountain and surrounding area. He might have completed his degree in architecture at MIT if he hadn't dropped his studies whenever there was another opening on a polar expedition. When he finally did settle down, it was to found an artist colony in Maine, but it didn't work out. Despite having never completed college, he was given a teaching job at MIT. While there, he became friends with James Hartness, already an established

machinist and inventor, who was living nearby in Springfield, Vermont. Hartness counted himself among those fortunate and privileged few in those days who had an observatory at his home. He introduced Porter to astronomy and sent him a pair of mirror blanks to work with. Russell Porter began the first in a series of innovative telescope designs he would become famous for. In 1918, Porter published an article about one of his designs, carried by both *Popular Astronomy* and *Scientific American*, detailing how to use a yoke to support a large telescope, with the mirrors held by three vane supports. Porter's obsession with astronomy would soon result in him leaving his teaching job to go to work for Hartness. Porter was certain he'd made the right choice when he was allowed to reconstruct Foucault's *Beautiful Experiment* in Hartness' workshop, using a pendulum to prove that the Earth rotates on its axis. This resulted in work grinding to a halt, as people, from far and wide, crowded the shop to witness the spectacle.

Russell Porter founded an astronomy club, called the Springfield Telescope Makers, whose membership was mostly comprised of fellow machinists and factory workers. Porter taught them how to grind mirrors and build telescopes at the distinctive, pink clubhouse, which was located on some land he had inherited. It's said that the pink colour was due to either someone mishearing instructions for "white with pink trim" or the result of a donation by someone getting the cheapest paint they could find. Albert Ingalls, the editor of *Scientific American*, met with Russell Porter in New York, and the editor agreed to do a story about telescope making and the astronomy club. Ingalls attended the first annual Stellafane Convention in 1926, which was specifically an event for amateur telescope builders, and wrote his article for *Scientific American* later that same year. Among those in attendance, was a group of visitors from the General Electric Lab. Given that the lab was run by Elihu Thomson, he was very likely in attendance. The *Scientific American* article inspired amateur astronomers from around the world to form clubs and construct telescopes of their own. This was a very important moment in amateur astronomy, where it changed from being the pursuit of affluent gentlemen to something accessible to the middle class. It inspired people like Clyde Tombaugh, who built a telescope from some spare parts on his parent's farm, leading to his employment at the Flagstaff Observatory, where he would discover Pluto.

Russell Porter went on to write a number of articles about telescope construction and mirror grinding for the magazine, as well as answering the growing pile of letters sent by readers. Porter was soon made a contributing editor at *Scientific American* and started a regular column called *The Back Yard Astronomer* (the column later moved to *The Amateur Scientist*). By 1926, Albert Ingalls had accumulated enough material, from articles in *Scientific American*, to publish a book on the subject: *Amateur Telescope Making*. There were a number of revised editions, with the last one published in 1996. While Russell Porter never gave much thought to building telescopes as a profession, his telescope design articles caught the attention of George Hale, who decided that this enthusiastic innovator was exactly who he needed.

Russell Porter was hired to be the project's Associate of Optics and Telescope Design, to design and oversee the building of the telescope that would house the 200" mirror at the Palomar Observatory. He also designed the observatory, astrophysics laboratory, machine shop, and optics lab. His three vane support system and "horseshoe" ring (modified yoke) already solved a lot of the problems that had plagued the design of the 100" telescope at Mount Wilson. While working at the observatory, Russell Porter found the time to do a proper topographical survey of Mount Palomar. Porter's skill as a draftsman was legendary. *The Cutaway Man* could observe a piece of machinery or architecture, and then quickly produce a series of cutaway drawings of very high quality, to show exactly how they worked or conversely why something didn't work.

George Hale died in 1938 and would never see the finished telescope that would bear his name. Afterwards, John Anderson, who had been brought over from the Mount Wilson Observatory and had already overseen a lot of the activity on Mount Palomar, now officially took charge of the project. With Hale's health failing in recent years, Anderson had already been running things in an unofficial capacity. Russell Porter also took on more administrative responsibility, after Hale died. Work temporarily ceased during World War II, after the bombing of Pearl Harbour. The expertise of Porter and the other employees at Palomar was in demand by the Allied war effort. Once work resumed, Porter's expertly made, cutaway drawings were even more important, with employees returning to work on projects they hadn't seen in years. Russell Porter was present at the 1948 ceremony, celebrating the completion of the Hale Telescope, but tragically died from a heart attack, just six days before first light on its massive mirror.

The lunar crater, known as Clavius B, was renamed *Porter* in his honour, and a crater on Mars was also given his name. Despite having never reached the North Pole, during his numerous expeditions, there is a lake on Baffin Island named after him. Russell Porter's meticulous Arctic Diary, complete with illustrations, can be found in the US National Archives Centre for Polar Archives and can be accessed online. His telescope and architectural, cutaway illustrations are on display and in the archives of a number of scientific institutions, across the United States.

Built on the summit of Breezy Hill, the Stellafane clubhouse is still in use by the group of amateur astronomers that Russell Porter founded. Stellafane remains a great source of knowledge for anyone interested in learning how to build their own telescope (stellafane.org). The Springfield Telescope Makers continue to host a yearly gathering of international, amateur telescope builders and the clubhouse has been designated as a national historic landmark. This year's Stellafane Convention is on August 1-4th and registration is currently open for anyone interested in attending this event.

Bruce Lane

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Better Know a RASCal



This is a series of short interviews done with members of the RASC Victoria Centre, to give you a better idea of the different experiences that other members have had. Our sixth interview is with Jim Hesser, who has for a long time been a fixture in the Victoria astronomy community, as a professional astronomer. He's been a member of RASC for over 30 years and recently retired as the longest serving director of the DAO (Dominion Astrophysics Observatory). He's received numerous awards for his work and he was instrumental in making it possible for our Victoria Centre Observatory to be built on Little Saanich Mountain.

SkyNews: What got you interested in astronomy as a career?

Jim: Around age 9 or 10, my brother-in-law showed me some constellations and stars, whose names he learned as part of his WWII navigation training. That got me paying attention to the night sky. In 7th grade, there was a short section on astronomy in the science textbook which, along with an outstanding teacher (Mr. Rethorst), ignited the science fire within me. I became seriously fascinated with everything astronomical, reading whatever I could get my hands upon. After saving up my allowance and doing lots of lawn mowing for neighbours, I acquired a 4-inch, Criterion telescope. I eagerly shared views with my family and neighbours as I learned the night sky.

Somewhere around the 9th or 10th grade, I began attending the monthly meetings of the Wichita Astronomical Society (WAS), where the adults in charge welcomed me and other young enthusiasts. A maths/physics professor at Friends University, Ms. Kirsty Swanson, hosted their meetings. She went out of her way to encourage several youngsters to participate. By grade 12, they tolerated me as president. I'm not sure how long it took the club to recover from that episode. Whenever I attend Victoria Centre's Astro Café, I'm reminded of how welcomed, encouraged, and empowered we teenagers and other newcomers were in the WAS.

Off-the-shelf gear in the mid-to-late 1950s was relatively (much) more expensive and of lower quality than what can be purchased today. Building your own telescope was the way to go, once aperture fever set in. Using mirror kits from Edmund Scientific, I ground and polished mirrors for a 6-inch and then for a 10-inch telescope. The latter, accompanied by astrophotography with an old 35mm camera, became my science fair projects for the 11th and 12th grades. Excellent comets, such as Arend-Roland 1956 and Mrkos 1957, were great fun to photograph, as were the star fields of the Milky Way. Funding for these projects came, starting in grade 9, from working weekends, during the school year, and summers at Elie Flower Shop and Greenhouses, a 3 mile bike ride from home. Through these years, the more I observed and read, the more my first inclinations towards pursuing astronomy as a career were stoked.

In the 1950s, the American Astronomical Society published a pamphlet by Freeman Miller (University of Michigan), titled *How to become an Astronomer*. I believe it cost 10 cents and it gave practical advice on the subject. The pamphlet also emphasized that throughout history a high fraction of astronomers had been independently wealthy (my family didn't qualify!), that there were very few jobs available, and that those jobs that existed you couldn't get a job without a Ph.D. (the first time I'd heard of that degree). From it I learned what courses I would need to pursue in university, which to my surprise included becoming fluent in two languages for the purposes of reading research papers. Until the late 1960s, North American science doctoral students needed to demonstrate fluency in two of three languages used for research in their field. For astronomy that meant German, French, and/or Russian.

Ignoring Prof. Miller's caveats about family wealth and the lack of jobs, I set out in 10th grade to pursue my dream. During high school, I sold programs at our school football games to earn money for our science club. Little did I realize that on the night of 4 October, 1957, while selling programs, I would be of the first generation of would-be astronomers who didn't

have to have familial wealth to have a chance to pursue their dream. The opportunity to surf the wave of space exploration would unfold as the world, especially the U.S. government, absorbed the significance of Sputnik's beeps every 96 minutes from near-Earth orbit, a pivotal Cold War moment that soon opened scholarship opportunities in the physical sciences.

SkyNews: What was the first telescope you looked through? (personal or professional)

Jim: One evening while our family was on an outing to our local drugstore, we encountered a sidewalk astronomer offering views of the Moon through his telescope for a fee. My parents paid so I could have a look; no doubt quite a bit of persistent pestering on my part was involved. It was a Newtonian, with a tube that seemed very long to a little kid. It required climbing up a ladder, which of course added to the adventure. I was wowed!

SkyNews: What's your favourite RASC public outreach or "inreach" event and why?

Jim: My appreciation for the diverse activities the Victoria Centre and the RASC nationally carry out is unbounded. Since I joined RASC Victoria Centre in 1985 (if I remember correctly) there have been so many excellent activities in Victoria that I've enjoyed, many with connections to nights on Observatory Hill, in support of the outreach that founding DAO Director J.S. Plaskett established a century ago. Starting with the return of Comet Halley, those activities very much inspired my efforts to get a proper visitor facility at the DAO, which transpired 15 years later. Choosing a favourite from all I've been privileged to be a part of is nearly impossible. However, the outreach partnership of RASC, FAAQ (Federation des Astronomes Amateurs du Quebec) and CASCA (Canada Astronomical Society/Société Canadienne d'Astronomie) that coordinated the year-long International Year of Astronomy 2009, reaching just shy of 2 million Canadians, was an extraordinary experience for me as chair of the national effort. I learned so much from the sustained interactions with RASC and FAAQ leaders throughout Canada during those four years. As well, Victoria Centre members truly excelled in term of IYA2009 participation. Many legacies of that year still bear fruit in Victoria. One IYA2009 element I particularly enjoyed working on was bridging the disciplines of music and astronomy during 2009, with the Victoria Symphony and the Early Music Society of the Islands. The 2017 and 2018 concerts featuring the music of William Herschel, in partnership with the Victoria Centre's David Lee and John McDonald, Christ Church Cathedral, and the Luchkow Jarvis Duo are continued legacies of IYA2009. We are now working on extending these Herschel concerts to other parts of Canada. Those concerts will invite local amateur astronomers to participate in the program concept and structure created here, so that their astrophotography can be highlighted for their neighbours, alongside that of Victoria Centre members. Fingers crossed that our fundraising efforts are successful!

SkyNews: What is your favourite book on astronomy?

Jim: Answering 1 above has brought youthful memories rushing back. From that era, my favourites were: H.A. Rey, *The Stars: A New Way to See Them* (I still recommend that book for his geometrical insights into finding things in the sky); *Norton's Star Atlas*; and *Amateur Telescope Making Vol. 1*.

SkyNews: What's an example of the technology you were using in your early research vs the technology currently used today for the same work?

Jim: Most of my astronomical research dealt with the properties of star clusters of various types in our galaxy, the Magellanic Clouds, or more distant galaxies. Since the 1800s, the photographic emulsion had been used to record observations. I greatly enjoyed astrophotography from my youth to my initial professional research at Cerro Tololo Inter-American Observatory, in Chile. There are many tales to tell of photographing the brilliant southern skies from Tololo, including from the prime focus cage of the newly installed 4-m telescope (now called the Blanco Telescope). I enthusiastically participated in the transition from photographic plates (scads of pixels, low quantum efficiency, and non-linear response) and the photomultiplier tubes (linear response, with a single pixel that we used to help calibrate photographic plates), to the "miracle" of charge-coupled-devices (CCDs) that occurred in the mid-1980s. The impact on stellar astrophysics-of the type I did-was transformative.

The person who made it possible for astronomers to do the best possible stellar photometry with CCDs is Victoria's own Peter Stetson, who came to the DAO in 1983 as a post-doc. He immediately set to work developing a tool to accurately measure the magnitude of stars on CCD image. His landmark 1987 paper, *DAOPHOT: A Computer Program for*

Crowded-Field Stellar Photometry, has been cited more than 4,400 times! What a privilege it's been to do astronomy in Victoria with so many outstanding astronomers, engineers, computer scientists, technical staff, and ingenious support staff as there are at the DAO, along with superb colleagues and students at UVic, and an appreciative, supportive RASC community.

SkyNews: You're well regarded as a mentor in the astronomy community. Without naming names can you remember a particular interaction where you helped an astronomer turn their career around?

Jim: From our years in Chile and Victoria there are many recollections I have of such instances. One prominent in my memory involved a University of Victoria graduate student with whom my family and I had become acquainted. The student was outstanding in every regard, from academics, to research, to comportment, as an extraordinary human being. Near the end of the dissertation work, the student became discouraged and racked with doubts- concerning having "the right stuff" or not. In a long conversation, one evening in our living room, along with insightful remarks from Betty, I argued that the answer was: "Absolutely. You have it!" The student completed their dissertation and is now a world leader in astrophysics. More generally, all of us at the DAO are extremely proud of the career successes of the dozens of post-doctoral scholars (Plaskett Fellows) who spend typically, three years working with us, since the program was established by Sidney van den Bergh, when he became Director at the beginning of 1978. In very recent times, additional positions through the NRC Postdoctoral Fellows program have increased the number of vibrant young researchers at the DAO. Over the last 40 years, nearly all of these bright, young scientists have shared their research with the Victoria Centre members.

SkyNews: During your time as an administrator is there one favourite accomplishment that you were part of?

Jim: The knowledge and experiences acquired, while serving as an NRC representative for 11 years, on the Board of the CFHT (Canada-France-Hawai'i Telescope)-the most successful international telescope partnership I know of—provided excellent preparation for serving for the next 11 years as one of the four North American members of the inaugural Board of Directors for the ALMA Observatory (Atacama Large Millimetre-submillimetre Array). ALMA was the first global astronomy project, created at a cost of \$1.5 billion to the project partners: Europe (European Southern Observatory), Japan (East Asia), and North America (Canada, U.S.); along with Taiwan participating as part of the latter two regional members (Yes, ALMA is complicated).

Lacking radio astronomy expertise, I stumbled into this opportunity when Simon Lilly unexpectedly left the Director General position he'd occupied only 13 fateful months and I succeeded him for a year, while the NRC identified an outstanding replacement (Greg Fahlman). During Simon's brief, but momentous stay, Canada successfully negotiated a critically important role with the US National Science Foundation and the National Radio Astronomy Observatory to build ALMA. In terms of organizational structure, CFHT and ALMA share a characteristic central to their success: the major partners have equal shares, as in any good marriage. ALMA partnership challenges were daunting, with some very rough spots along the way. Indeed, the project nearly died at the first international meeting of the (pre-board) ALMA Coordinating Committee I attended. Nevertheless, the promise of a transformational scientific facility, requiring much more funding than any single partner could raise, repeatedly inspired the project partners to learn how to solve problems together. Time and time again, I would draw upon experiences I'd had from CFHT -where I'd been Chair of the Board of both the Finance and of the Personnel Committees- to seek ways to nudge discussions along. During those 11 years, I chaired the inaugural ABC (ALMA Budget Committee). That might sound boring, but it was anything but, given the need to address core partnership issues manifested in budget challenges if we were to achieve ALMA's ambitious astronomical goals. The ABC always met before the Board did, thus serving as a forum to expose the most contentious items that required discussions and negotiations outside the formal Board meetings to find solutions (a trip to the bar occasionally played a constructive role too). I also enjoyed serving on the Board's inaugural Science Committee, where over several years we developed an effective process for engaging scientific advisory bodies in the three partner regions, so they could help guide the Board on decisions that would maximize the partnership's scientific output.

Being present at the ALMA inauguration, with the President of Chile, on 13 March, 2013 with Greg Fahlman and Canada's Ambassador to Chile, Patricia Fuller, was a very meaningful day. Watching the video recorded on the ISS, for ALMA's inauguration, by astronauts Tom Marshburn and Chris Hadfield-a crazy idea I'd proposed to the NSF (National Science Foundation) after seeing what a brilliant job of communicating Chris Hadfield was doing from the ISS-makes me quite emotional every time I call it up from the Internet.

Now well into operations, ALMA is proving to be incredibly successful scientifically, with strong participation from Canadian astronomers, including many at the DAO and UVic, in terms of both science and operations. It is also gratifying that, following two directors with European training and experience, ALMA has at its helm its first North American Director: Sean Dougherty from DRAO (Dominion Radio Astrophysical Observatory), Penticton.

With ALMA, I couldn't have had a more interesting nor challenging activity with which to conclude my final years as an employed astronomer. It was an honour and privilege to have had a very small part in the multi-decade, international effort to build ALMA. Some 60 years since I first read *How to become an Astronomer*, I'm grateful to many, many people for their generous help along the way. During ~35 years of the journey, I've benefitted in untold ways from the advice, friendship, support, and encouragement of RASC Victoria Centre members. It goes without saying that none of this story could have happened without Betty's loving support. From the start of my graduate studies, 56 years ago, she has put up with my many shortcomings and made untold sacrifices. My heartfelt gratitude goes to her, for what we've accomplished together.

Astronomical Term of the Month: Aperture

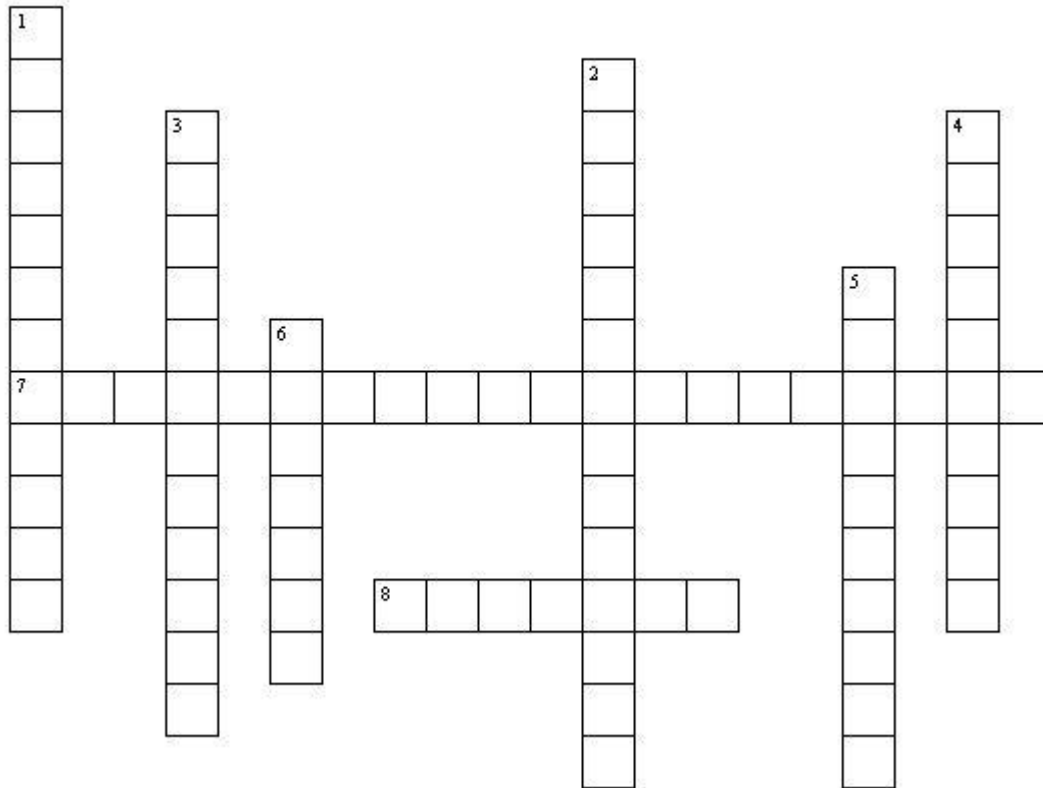
Aperture is used in astronomy to refer to the diameter of the primary lens or mirror of a telescope. The larger the mirror or lens, the more photons it refracts or reflects into the eyepiece, and the fainter the object you can observe. It's why larger, Dobsonian reflector telescopes are referred to as *light buckets*. The term *aperture fever* is often used by amateur astronomers, whose eyes light up with the possibilities of using a larger telescope than they currently have. These same amateur astronomers can quickly come back to Earth when they realize just how much set up time is required or how cumbersome these same larger telescopes can be. A contributing factor to the affliction of *aperture fever* is the fact that when you double the diameter of your primary lens or mirror you quadruple its light gathering ability! If you were to trade in a 6" aperture telescope for one with an 8" diameter mirror, the light gathering ability increases by 77%; while the jump from 8" to 10" aperture nets only a 56% improvement. For many observers, the 203.2mm (8") diameter mirrors are the best jumping off point for deep space observing, where you have enough aperture to not be too limited by what you can see, but not so large that it's too much telescope to haul around.

Aperture resolves what you can magnify with your eyepiece, in that you can only magnify what light your primary lens or mirror is capable of refracting or reflecting. Very small telescopes are also limited by how much magnification they can use. In ideal conditions, you can have 50X magnification per inch of aperture. Here on the West Coast, underneath the turbulent jet stream, 30X per inch is often more realistic. Even then, the atmosphere will set its own upper limits of useful magnification long before the aperture of most telescopes will.

Despite being a nation that uses the metric system and telescopes being scientific instruments, telescope aperture is more likely represented in units of inches than any metric measurement. Whether this is in part due to the blue collar, amateur telescope revolution that started at Stellafane or the influence of our southern neighbour's resistance to the metric system, the measurements used for amateur astronomy telescopes are a checkerboard and imperial and metric units.

Bruce Lane

June Astro Crossword



ACROSS

- 7 The name of the yearly gathering of telescope builders in Springfield.
8 Location of the Hale Telescope.

DOWN

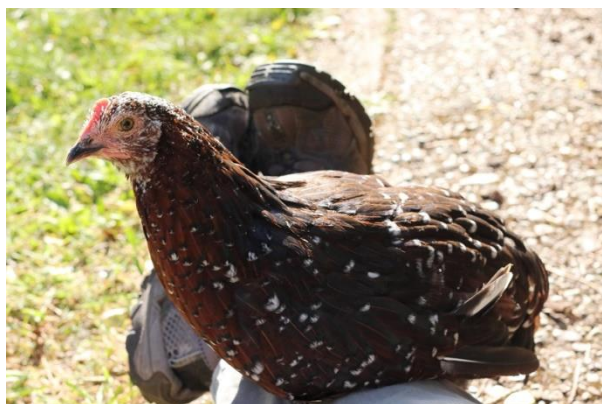
- 1 The location of the lake named after Russell Porter.
2 This inspired Diane's cookies at the last Astro Café.
3 Dr. Jim Hesser's primary astronomy research subject.
4 The type of vehicle NASA is scheduled to send to Mars next year that was recently tested.
5 Where the meteor that caused the Tungusta Event probably originated from.
6 Where the 2018 RASC General Assembly was held.

May Astro Crossword Answers

Across 1: Assad Dina is the financier of the Dina optical laboratory; **Across 2: 100"** telescope on Mount Wilson named after **John Hooker**; **Across 4: Bluewalker** is the name of Lithuanian satellite launched in April; and **Across 6: The Crater Creator** is the name of Nathan's science project.

Down 1: Alouette One is the name of first Canadian satellite; **Down 3: Hubble** is a **Ritchey**(-Chretien) telescope (*there was a software glitch that resulted in the word "Chretien" being submitted as a clue instead of an answer in the crossword*); **Down 5: Messier** initially catalogued M87 as a **nebula**; **Down 7: Tasco** was the manufacturer of Chris Gainor's first telescope.

In Closing



Saturday Nights at the DAO are in full swing, with many RASCals volunteering their time up on Little Saanich Mountain. Once we get to the other side of the Summer Solstice, RASC Victoria will be getting involved in a number of public outreach events of our own.

Star Party season will soon be upon us and with it the threat of wildfire smoke that seems to have become a regular part of the weather reporting in BC. If you're traveling to a star party this summer, remember to pay close attention, not just to the weather, but to the Ministry of Forestry wildfire news sites. Our own Victoria RASCals Star Party, at St Stephen's churchyard, is scheduled for September 27-29th, to keep us out of harm's way from the smoke and

still get us some New Moon observing time that isn't on a long weekend.

Another thing to look out for is any big fireballs in the sky, when the Earth plows through a denser part of the Beta Taurid debris field left behind by the Comet Encke. The last time Earth passed through this region of the Beta Taurid was in 1975, resulting in some notable meteor strikes on the Moon. The Tunguska Event of 1908 is believed to have been caused by a meteor from the Beta Taurid debris field, but before you find a table to hide under, remember that space is big and most meteors, the ones that manage to hit our planet, land in the ocean. We still don't know a lot about the density of this part of the debris field and while there are models showing the normally dispersing debris being held together by Jupiter's gravity, we'll have to wait until this summer for scientists to properly examine this region of space close up. For the truly paranoid, there's probably someone out there trying to rebrand those flimsy SkyLab *safety* helmets, from when people were worried about the American space station falling on them. We should have already started seeing the first of these meteors, with the peak of the meteor shower occurring on the evening of June 28th, which just happens to be one of our weekly observing sessions at the VCO!

While the public outreach and scheduled observing sessions at the Victoria Centre Observatory continues throughout the summer, Astro Café shuts its doors until September. Council also takes a hiatus from their in-person meetings, although there will still be a lot cyberspace meetings via email, given that we're continuing to do most of our public outreach events by committee. Apparently, I also get a summer break, so your next issue of *SkyNews* won't be out until late September, at the earliest.

Bruce Lane: SkyNews Editor

Photography Credits

Cover: NGC 891, image by John McDonald, using data collected between 2018-12-30 and 2019-03-04, using the 20" aperture, f/4.6 telescope, at the SDG Observatory of Garry Sedun, in Arizona. Moravian G3 16200 camera with 50 B, 56 G, 54 L and 41 R subs each 300s with darks and bias, but no flats for calibration (Pixinsite and Photoshop used for post-production software).

Page 2: Laurie Roche and Jim Hesser cutting the Plaskett Cake on Observatory Hill, during the Victoria 2014 GA; June 26th, 2014, picture by Bruce Lane

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

Page 5: Posed Book, "The Backyard Astronomers Guide, by Terence Dickenson and Alan Dyer", taken in UVic Astronomy Teacher's Lounge on Oct 10, 2018, by Bruce Lane

Page 6: Observing Session at the VCO, May 31st, 2019; by Joe Carr

Page 8: Portrait of Elihu Thomson, about 27 years old, taken around 1880, photographer unknown

Page 9: Gigantic "Eye" arrives in Pasadena: Archives of Pasadena Star-News; April 10th, 1936

Page 9: Signature of Marcus Brown on Palomar Mirror, from Caltech Archives

Page 10: Russell Porter drawing, Norwich University, date and photographer unknown

Page 11: Printed Notice for the first Stellafane Convention, 1926

Page 12: Crop of Jim Hesser as Galileo, doing IYA2009 public outreach at Fairfield Community Centre, September 28th, 2009, by Chris Gainor

Page 17: Speckled Suffolk Pullet roosting on Photographer, May 12th, 2019, by Bruce Lane

Call for Article and Photo Submissions for September Issue

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

RASC Victoria Centre Council 2018 / 2019

Position	Name	Email
Past President	Chris Purse	pastpres@victoria.rasc.ca
President	Reg Dunkley	president@victoria.rasc.ca
First Vice President	Somewhat Vacant	vp@victoria.rasc.ca
Treasurer	Deborah Crawford	treasurer@victoria.rasc.ca
Secretary	Barbara Lane	secretary@victoria.rasc.ca
Librarian	Diane Bell	librarian@victoria.rasc.ca
Technical Comm Chair/Sys Admin	Matt Watson	admin@victoria.rasc.ca
Skynews Editor	Bruce Lane	editor@victoria.rasc.ca
School Outreach	Laurie Roche / Sid Sidhu	
Telescopes	Sid Sidhu	telescopes@victoria.rasc.ca
National Representative	Nelson Walker	nationalrep@victoria.rasc.ca
Light Pollution Abatement	Dave Robinson	lighting@victoria.rasc.ca
Membership Coordinator	Chris Purse	membership@victoria.rasc.ca
Observing Chairperson	Jim Stillburn	obschair@victoria.rasc.ca
Website Content	Joe Carr	web@victoria.rasc.ca
Members at Large		
NRC Liaison	James di Francesco	
Nat RASC Anniversary Wrkg Group	Dr. James Hesser	james.Hesser@nrc-cnrc.gc.ca
FDAO Liaison	Laurie Roche	
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Observing	David Lee	Li-Ann Skibo
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