NOVA
NEWSLETTER OF THE VANCOUVER CENTRE RASC
VOLUME 2024 ISSUE 1 JANUARY FEBRUARY 2024

Paul Sykes Lecture - Dr. Tanya Harrison

Coming in February (watch Meetup for further details)

I think I speak for all of us—and in a great understatement—when I say that the COVID-19 pandemic really threw us all for a loop. Workplaces closed, schools shuttered, transit emptied, and other human beings became almost pariah; let's not draw too close to one another, lest we catch The Virus. The pandemic isn't over, but most of the restrictions that governed and shaped our lives in the early goings have since faded into the haze of the early 2020s. Throughout the early years of this decade, however, were countless stories of ingenuity driven by curiosity and perseverance. Dr. Harrison is both the Co-Founder and CEO of the Earth and Planetary Institute of Canada—aptly abbreviated EPIC—after stints with Planet Labs, as well as Arizona State University's NewSpace Initiative. She's currently a fellow of the University of British Columbia's Outer Space Institute.

Dr. Harrison has more than 20 cumulative years of experience with both NASA and the CSA across close to a dozen Mars or Mars-analogue missions. She's a widely-acclaimed planetary science expert, and is currently a co-investigator on the CSA's lunar rover mission, launching to the Moon no earlier than 2026. Of note, she's also been—and continues to be—an active voice of advocacy in the ongoing effort to increase diversity, inclusion, and

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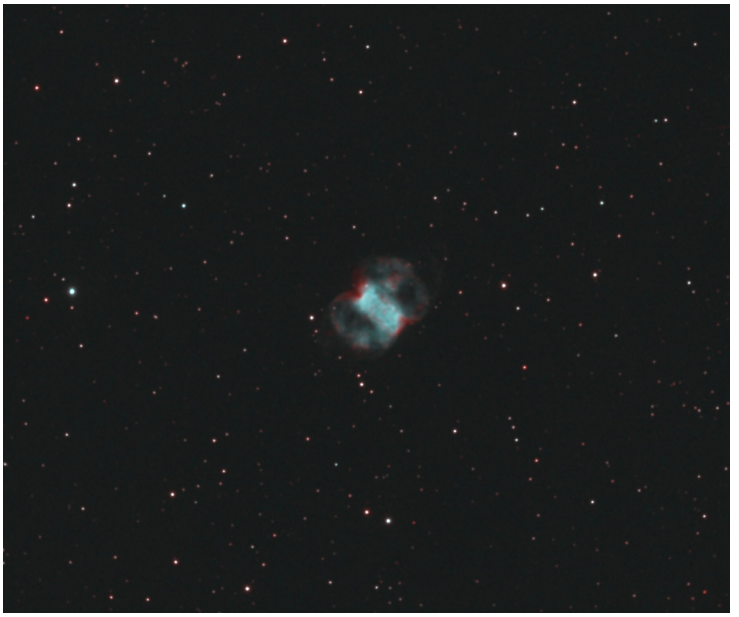
JANUARY 11 — **SFU**
NASA Solar System Ambassador Matthew Borghese: Looking Back on 2023, Looking Ahead to 2024. Room AQ3159 and Zoom.

FEBRUARY 8 — **SFU**
Our annual Paul Sykes lecture, featuring planetary scientist Dr. Tanya Harrison (see above). Watch Meetup for further details.

MARCH 14 — **SFU**
Speaker and room location TBD. Watch Meetup for updates.

Members' Gallery



M76, The Little Dumbbell Nebula

by Phil Lobo

Messier 76, also known as the Little Dumbbell Nebula or NGC 650/NGC 651, is a planetary nebula in the constellation Perseus. Compared to its more famous cousin, the Dumbbell Nebula in Vulpecula, M76 is 2.4 magnitudes fainter and one-third the apparent size. However, it is visible in small telescopes. As is the case for all planetary nebulae, a nebular filter (i.e. passing the green-blue Oiii band) improves visibility. The two bright lobes at each end are more easily seen than the fainter stem between them. William Herschel listed the two lobes as separate objects, hence the two NGC numbers. The distance is not accurately known but is estimated to be about 2500 light years, resulting in a size of about 1.2 light years across. (Image details: 200mm f/3.9 Newtonian, Ha - 84min; Oiii – 64min.)

NGC 3718 & 3729 by Mark Germani

It's been a while, but I thought I'd process another image from the RASC Robotic Telescope. I started working on this image in October, but ran into some challenges incorporating the Ha data. After finishing my M33 with Ha added, I figured I could use the same technique here, and I'm satisfied with how it worked out.

I have offset the framing of NGC 3718 to emphasize its interaction with NGC 3729, seen in the upper-right. It is believed that they interact gravitationally, which has led to the unusual shape of NGC 3718, which would likely otherwise be a regular spiral galaxy.

Also included in this image is the Hickson Compact Group 56, just above and to the left of NGC 3718. Despite appearances, HCG 56 is roughly 8 times more distant than NGC 3718. I found it difficult to resolve much detail for this group.

Many thanks to the RASC Robotic Telescope team for the data!

President's Message

by Robert Conrad

I'm excited to be your new President and wish all of you a Happy New Year and clear skies for 2024. First off, though, I would like to thank Alan, our outgoing president, and the other council members for continuing to push the needle on building a strong astronomy culture within our membership and with our partners at SFU and the public. I also want to thank the many volunteers that made all of the events possible during the last year.

As president and education co-director and observing director, one of my goals during the next two years is to enhance the observational abilities and bring our members and public to a level where they can find any object in the sky and make the absolute most of their night observing sessions whether naked eye, binocular, or through a telescope. I also hope to pub-

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About RASC

The RASC Vancouver Centre meets at 7:30 PM on the second Thursday of every month at SFU's Burnaby campus (see map on page 4). Guests are always welcome. In addition, the Centre has an observing site where star parties are regularly scheduled.

Membership is currently $104.00 per year ($61.10 for persons under 21 years of age; family memberships also available) and can be obtained online, at a meeting, or by writing to the Treasurer at the address below. Annual membership includes the invaluable Observer's Handbook, six issues of the RASC Journal, and, of course, access to all of the club events and projects.

For more information regarding the Centre and its activities, please contact our P.R. Director.

NOVA, the newsletter of the Vancouver Centre, RASC, is published on odd-numbered months. Opinions expressed herein are not necessarily those of the Vancouver Centre.

Material on any aspect of astronomy should be e-mailed to the editor or mailed to the address below.

Remember, you are always welcome to attend meetings of Council, held on the first Thursday of every month at 7:30pm in the Trottier Studio in the Chemistry wing of the Shrum Science Centre at SFU. Please contact a council member for directions.

2024 Vancouver Centre Officers

President	Robert Conrad president@rasc-vancouver.com
Vice-President	Nolan Smith vp@rasc-vancouver.com
Secretary	Kyle Dally secretary@rasc-vancouver.com
Treasurer	Phil Lobo treasurer@rasc-vancouver.com
National Rep.	Nolan Smith national@rasc-vancouver.com
Librarian	William Fearon library@rasc-vancouver.com
Public Relations	Andrew Ferreira publicrelations@rasc-vancouver.com
LPA	Leigh Cummings lpa@rasc-vancouver.com
Dir. of Telescopes	Rick Schneider telescopes@rasc-vancouver.com
Observing	Robert Conrad observing@rasc-vancouver.com
Membership	Marla Daskis membership@rasc-vancouver.com
Events Coordinators	Suzanna Nagy, Kai Hui events@rasc-vancouver.com
Education	Andrew Krysa education@rasc-vancouver.com
VRO	Alan Jones observatory@rasc-vancouver.com
Merchandise	Vacant merchandise@rasc-vancouver.com
Webmaster	Martin Curic webmaster@rasc-vancouver.com
NOVA Editor, Past President	Gordon Farrell novaeditor@rasc-vancouver.com
Speakers	Andrew Ferreira speakers@rasc-vancouver.com
Imaging	Rob Lyons imaging@rasc-vancouver.com
At Large	Shay Pomeroy, Michael Levy, Gordon Baush, J. Karl Miller

Library

The centre has a large library of books, magazines and old NOVAs for your enjoyment. Please take advantage of this club service and visit often to check out the new purchases. Suggestions for future library acquisitions are appreciated.

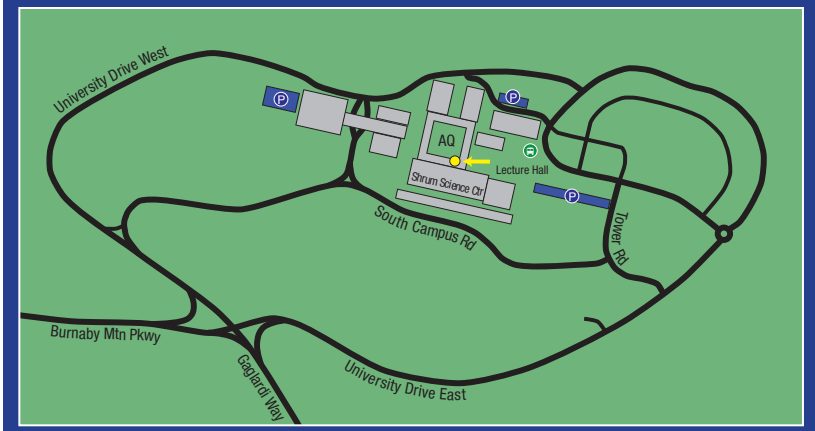
On the Internet

rasc-vancouver.com
astronomy.meetup.com/131/
www.facebook.com/RASC.Van
www.instagram.com/rascvancouver/
@RASCVancouver

Mailing Address

RASC Vancouver Centre
PO Box 89608
9000 University High Street
Burnaby, B.C.
V5A 4Y0

Map to Meeting Site



Our January meeting is in room AQ 3159 of the Academic Quadrangle, near the southeast corner next to the cafeteria, as indicated by the arrow on the map.

Pay parking is available at several locations located around campus (indicated as "P" on the map).

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lish a book (if not externally, at least internally through RASC) that I've been working on with Andrew, our education co-director, which fills many gaps in existing books. I will continue to offer courses online virtually and some in-person workshops at SFU.

Alan and his team of RASC volunteers and council members have also been turning the VRO RASC observatory into a powerful imaging and observing machine by landscaping the grounds around the observatory for additional telescope viewing. Next year, there are two major events that I believe will generate even more interest in astronomy. The first being the total solar eclipse (in parts of Canada) in April (partial from Vancouver) and in October a comet (C/2023 A3) that has a high probability of becoming naked eye.

I encourage you to reach out with any feedback and suggestions you have as the year progresses. You can easily reach any one of the council members by referring to this page: https://rasc-vancouver.com/contacts/. I look forward to meeting you virtually and in person during the next few months. If you are interested in joining council, we also have one vacant position for our Merchandise chair so please reach out to learn more about the role and how this could benefit your volunteer experience portfolio.

Best Wishes,
Robert Conrad ✸

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accessibility in the aerospace sector for people from backgrounds that have been historically disenfranchised, marginalized, and excluded from backgrounds in STEM.

Dr. Harrison holds a Ph.D. in Geology with a Planetary Science and Exploration specialization from the University of Western Ontario, where her research focused on the formation of Martian features known as gullies, and what they're able to tell us about the recent climate history of Mars. She also holds a Masters in Earth and Environmental Sciences from Wesleyan University where she studied spectroscopy of hydrated minerals on Mars, and a B.Sc. in Astronomy and Physics from the University of Washington where she studied the metallicity of star clusters and recurring novae systems.She was also awarded the Vanier Canada Graduate Scholarship, Canada's most prestigious doctoral award.

It's my absolute pleasure to welcome her to Vancouver in February for a presentation on the most recent updates from Mars, what our future prospects for putting people on the Martian surface look like, and the new science that she's hoping to see from planetary science missions to Mars, and beyond.

This annual lecture is held in memoriam of Paul Sykes, who passed away in October of 2005. Paul was a life-long RASC member and avid supporter. Upon his passing, he bequeathed a substantial sum that has kept our Vancouver Centre financially solid for the last 15 years.

Paul was born in Hummelston, Pennsylvania, USA in 1918. From an early age, he was keenly interested in astronomy. During his teens, he even published his own monthly astronomical column. He was an officer in the United States Air Force and served in the Pacific theatre during the Second World War, attaining the rank of Captain. Following the war, Paul attended UBC in 1948, earning a degree in physics. He rejoined the U.S. Air Force and attended the Oak Ridge School of Reactor Technology, studying nuclear physics. He worked on the Nerva Project, a nuclear rocket development effort.

Thereafter, Paul returned to BC and was appointed a lecturer and administrator in Physics at UBC, where he remained until his retirement in 1983.

Keep an eye out for more details about our 2024 Paul Sykes lecture coming up in February. ✸

Membership has its Privileges!

Are you tired of looking at the same objects again and again (planets, moon, etc.)? Is your telescope collecting dust because it's hard to locate deep sky objects? Would you like to bring your observing to a stellar level? Robert Conrad, our observing director, leads the Vancouver RASC observing group and invites you to join by sending him an email at observing@rasc-vancouver.com. Some of the benefits of belonging to this group include:

- Hands on training on how to operate the SFU Trottier observatory
- Weekly observing sessions at the observatory or at dark sky locations
- One-one-one coaching on how to locate thousands of objects in the night sky
- Attend small interactive seminars delivered by Robert on a range of topics including failsafe star-hopping, charting challenging objects and understanding the motions of the cosmos
- Learn to make your telescope dance by locating objects such as asteroids, nova, and supernovae
- Spectroscopy and imaging training from Howard Trottier and an opportunity to collaborate on observatory research projects
- Updates on observable sky events happening during the week like asteroid/comet/deep sky conjunctions
- Access to observing guides and lists that Robert created that took hundreds of hours to create and will help with planning observing sessions
- Knowledge and expertise from other observing group members
- Learn how to quickly and efficiently find and star-hop to deep sky objects using a range of binoculars and telescopes

Upcoming Events

April
8 – Solar eclipse (partial in Vancouver)

August
3 - 11 – Mt. Kobau Star Party

December
12 – AGM

RASC Vancouver Centre – 90 Years

by Suzanna Nagy

On November 9, 2023, RASC Vancouver celebrated its 90th anniversary. Our regular monthly meeting was held in person at SFU and also via Zoom. We celebrated with an amazing speaker, Dr. Robin Catchpole. Dr. Catchpole is the astronomer at the Institute of Astronomy, Cambridge, having retired as Senior Astronomer at the Royal Observatory Greenwich in July 2004. His lecture was on Black Holes, Dark Matter, and Vacuum Energy. Those that attended in person also celebrated after the meeting with cake and conversation. A review of our archives reveals the minutes from the very first meeting held 90 years ago. The Minutes are duplicated below:

The newly organized Vancouver Centre of the Royal Astronomical Society of Canada, held its first open meeting at the University of British Columbia on Tuesday, November 10, with a good attendance of members, university students, and general public.

Dr. Daniel Buchanan, Dean of the Faculty of Arts and Science and Professor of Mathematics at the University of British Columbia, the Honorary President of the Centre, gave the address choosing as his subject "The making of worlds." He gave a very interesting historical survey of the various theories which were held concerning the solar system, and the universe from the time of Pythagoras to that of Newton. This was followed in the second half of the address with an illustrated discussion of the nebular, planetesimal, and collision theories of the origin of the solar system, together with some of the objections to these views. Lecture concluded with a short description of the modern views, considering the nature of spiral nebulae, and the structure of the Galaxy. ✸

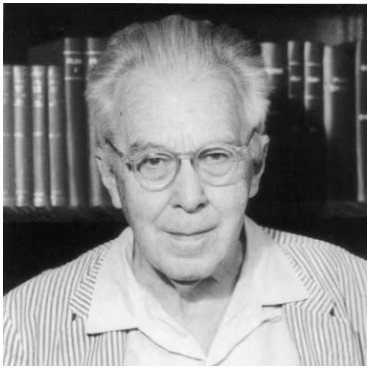
A Glimpse into the Work of Otto Neugebauer

by Michael Levy

In her biography of the great mathematician David Hilbert[1], Constance Reid reports of a banquet that Hilbert attended in Göttingen, Germany in 1934. He was asked by the Nazis' newly appointed minister of education: "And how is mathematics in Göttingen now that it has been freed of the Jewish influence?" to which he replied, "Mathematics in Göttingen? There is really none any more."

In the years leading to this point, the University of Göttingen was a leading centre of Mathematics and Physics. In 1933, all Jewish scientists at the university were forced to resign. The list of names of those expelled reads like a who's-who of these disciplines: Max Born, Victor Goldschmidt, James Franck, Eugene Wigner, Leó Szilárd, Edward Teller, Edmund Landau, Emmy Noether, and Richard Courant.

But the exodus did not stop at Jewish academics. Other members of the university left, too, rather than work under the Nazi regime. Amongst these was the young assistant professor, Otto Neugebauer, a student of Richard Courant. In fact, after Courant was expelled, Neugebauer was placed at the head of the Mathematical Institute, but he lasted exactly one day: he refused to sign the required oath of loyalty. Shortly after that, in January 1934, he obtained a three-year appointment as a professor at Copenhagen.



Otto E. Neugebauer, 1899-1990

In 1931, Neugebauer had become the founding editor of the review journal "Zentralblatt für Mathematik und ihre Grenzgebiete" (Central Journal for Mathematics and related areas), commonly known as Zbl. The meddling in this journal's editorial board and content by the ruling Nazis ultimately convinced him to emigrate to the USA in 1939.

Part of the Rhind Papyrus

Neugebauer began his time at the University of Göttingen studying mathematics with Courant, Edmund Landau and Emmy Noether. But, during a visit to the University of Copenhagen in 1924/25, he became interested in Egyptian mathematics, and switched his interest to ancient mathematics, and, later, astronomy. His thesis was a mathematical analysis of the Rhind Papyrus. He was granted his "venia legendi" (license to teach) for the history of mathematics in 1927.

After the debacle over Zbl, Neugebauer emigrated to the USA where he was appointed as a professor at Brown University. In the years to come, Brown University became known for its strength in the Astral Sciences, that is, the study of astronomy and astrology[2].

Neugebauer's contributions to our understanding of ancient mathematics and astronomy are much too comprehensive to cover in this short article. Instead, I will talk about just one of his works, namely "Astronomical

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1 *Hilbert*, by Constance Reid, George Allen & Unwin, Springer-Verlag, 1970

2 Astrology these days has a bad reputation because, as we all know, its use for prediction is nonsense. And I certainly hope that none of the people reading this read horoscopes! But, historically speaking, astrology and astronomy were deeply interconnected. After all, it was clear that astronomical events, such as the phase of the moon, correlated with earthly phenomena like the tides. So why not other events?

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Cuneiform Texts" (ACT).

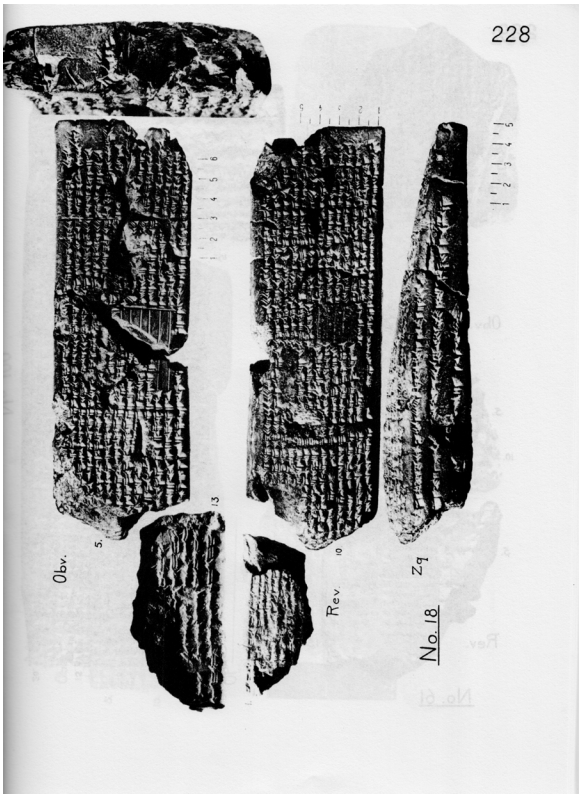
As you may know, cuneiform tablets are clay tablets from ancient Mesopotamia that were "written" using a stylus in Akkadian or Sumerian. Many thousands of these tablets have survived, and they cover a range of subjects, including what I will loosely call astronomical topics. In the second millennium BCE, that is around 2000 BCE, there are records of various celestial events or omens (called *signs* in Sumerian). Eclipses, for example, were considered to be dangerous, and early tablets describe techniques for warding off the bad consequences of eclipses.

The serious study of celestial events, what we might consider the birth of astronomy, probably occurred starting around 1500 BCE. This was later followed by a much more systematic attempt to make observations, and, in the era covered by ACT, systematic techniques for predicting celestial events such as full moons, eclipses, first appearances, stationary points, and so on.

ACT is a three-volume collection covering Babylonian astronomy during the Seleucid period (312-364 BCE). It covers the motion of the Moon, the Sun and the planets.

Neugebauer spent many years on this work, and continued working on the material after it was published in 1955. (His major work, *A History of Ancient Mathematical Astronomy*, was published in 1978.)

What is ACT? Volume III contains translations of over 200 tablets, covering tables for predicting various events, so called procedural texts, and certain key events. The photograph above will give you some idea of the starting point for such work.



After, we can only imagine, a massive amount of work, this led to his translation, shown on the next page.

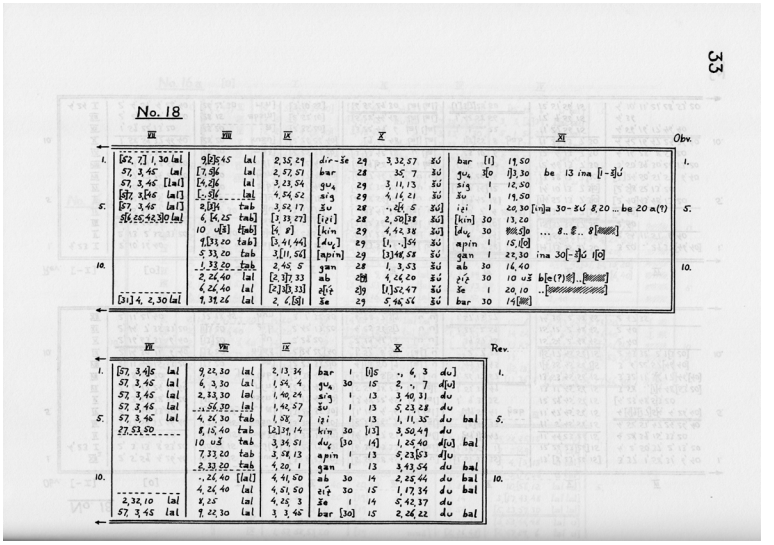
Volumes I and II give a general overview of the texts and a detailed description of the methods used by these ancients to make predictions based on the tables. The methods used are arithmetical—there was no attempt in these tablets to use geometry or to develop a cosmological model. Nevertheless, they do show a sophisticated understanding of mathematical principles.

Tablet 18, for example, and shown at right, is a table for new and full moons for the year 263 of the Selucid era. Column XI is, according to Neugebauer, of particular interest because it is one of the few tablets where a column of first visibilities is preserved. As far as I can tell (and I am not expert in reading these translations) the entries in this column list a month, followed, I assume, by the time of that month's first visibility of the new moon (and, possibly, the last visibility of the waning moon).

After Neugebauer published ACT, he continued to work on ancient astronomy. Remarkably, he wrote his last paper in 1988 at the age of 89. It was titled "From Assyriology to Renaissance Art" and in it he demonstrated that Greek astronomers had access to Babylonian astronomical material.

In an obituary written by one of his colleagues, N. M. Swerdlow writes: "Otto Neugebauer was the most original and productive scholar of the history of the exact sciences, perhaps of the history of science, of our age." Francesca Rochberg, a prominent American Assyriologist, writing about the Brown School of Astral Sciences, writes "The recovered astronomical cuneiform texts, in the hands of Otto Neugebauer, would ultimately change the entire face of the history of science."

Neugebauer made one other great contribution to astronomy: Gerry Neugebauer, the late American astronomer, who, amongst other contributions to modern astronomy, was the director of the Palomar Observatory from 1980 to 1994, was his son.



For the lay reader, Neugebauer's writings are challenging, but the glimpse they give us into the history of astronomy is endlessly fascinating. ✸

Introducing the Vancouver RASC Observatory!

by Alan Jones & Marla Daskis

If you've joined the member meetings, you've probably heard that the Vancouver RASC Observatory is finally ready for members to enjoy. Now is the time for you to get involved, use it and help make it better!

Our VRO is a great member asset for Vancouver Centre. It supports both visual observing and astrophotography, provides a social setting for members to exchange knowledge and ideas, and provides a learning environment for members who want to learn about telescope operations. Only 35 minutes from Vancouver, its dark skies are perfect for astronomers!

Members wanted on site!

Want to get involved onsite? We need enthusiastic and interested members to:

- Help plan, organize and run events with the Observatory group
- Bring telescopes to the site during events
- Make time to help maintain the grounds.

If this sounds like you, contact the Observatory Chair to get in on the action.

Support your VRO

Maybe on-site involvement isn't your thing? You can still provide much-needed support for the VRO!

The Vancouver RASC is a registered charity—consider a contribution (you'll get a charitable receipt) directed to the VRO.

All the data generated by VRO imaging sessions is available to Vancouver RASC members—request access and process the data into awesome astrophotos.

Let us know you are interested by contacting us and by talking to other members. Join us in making the most of our club asset, and enjoy socializing with like minded members. We look forward to seeing you soon! ✸

Monthly Dark Hours for Vancouver

by Robert Conrad

Date - January 2024 (UT -8)	Sunset	Twilight ends	Twilight begins	Sunrise	Moonrise	Moonset	Hrs Dark	Moon %	Prime time
Monday, January 1, 2024	**4:24 PM**	**6:21 PM**	**6:11 AM**	**8:08 AM**	**10:31 PM**	**11:31 AM**	**4:10:00**	**73.9**	**6:21 PM - 10:31 PM**
Tuesday, January 2, 2024	4:25 PM	6:22 PM	6:11 AM	8:08 AM	11:38 PM	11:43 AM	5:16:00	65.0	6:22 PM - 11:38 PM
Wednesday, January 3, 2024	4:26 PM	6:23 PM	6:11 AM	8:07 AM	12:46 AM	11:55 AM	6:23:00	55.6	6:23 PM - 12:46 AM
Thursday, January 4, 2024	4:27 PM	6:24 PM	6:11 AM	8:07 AM	1:56 AM	12:13 PM	7:32:00	45.8	6:24 PM - 1:56 AM
Friday, January 5, 2024	**4:29 PM**	**6:25 PM**	**6:11 AM**	**8:07 AM**	**3:10 AM**	**12:10 PM**	**8:45:00**	**35.9**	**6:25 PM - 3:10 AM**
Saturday, January 6, 2024	**4:30 PM**	**6:26 PM**	**6:11 AM**	**8:07 AM**	**4:27 AM**	**12:28 PM**	**10:01:00**	**26.3**	**6:26 PM - 4:27 AM**
Sunday, January 7, 2024	4:31 PM	6:27 PM	6:11 AM	8:06 AM	5:47 AM	12:51 PM	11:20:00	17.5	6:27 PM - 5:47 AM
Monday, January 8, 2024	4:32 PM	6:28 PM	6:10 AM	8:06 AM	7:03 AM	1:25 PM	11:42:00	9.9	6:28 PM - 6:10 AM
Tuesday, January 9, 2024	4:33 PM	6:29 PM	6:10 AM	8:05 AM	8:08 AM	2:13 PM	11:41:00	4.2	6:29 PM - 6:10 AM
Wednesday, January 10, 2024	4:35 PM	6:30 PM	6:10 AM	8:05 AM	8:58 AM	3:19 PM	11:40:00	0.8	6:30 PM - 6:10 AM
Thursday, January 11, 2024	4:36 PM	6:31 PM	6:10 AM	8:04 AM	9:34 AM	4:40 PM	11:39:00	0.4	6:31 PM - 6:10 AM
Friday, January 12, 2024	**4:37 PM**	**6:32 PM**	**6:09 AM**	**8:04 AM**	**10:00 AM**	**6:10 PM**	**11:37:00**	**3.0**	**6:32 PM - 6:09 AM**
Saturday, January 13, 2024	**4:39 PM**	**6:33 PM**	**6:09 AM**	**8:03 AM**	**10:20 AM**	**7:40 PM**	**10:29:00**	**8.6**	**7:40 PM - 6:09 AM**
Sunday, January 14, 2024	4:40 PM	6:35 PM	6:08 AM	8:02 AM	10:37 AM	9:07 PM	9:01:00	16.7	9:07 PM - 6:08 AM
Monday, January 15, 2024	4:42 PM	6:36 PM	6:08 AM	8:02 AM	10:52 AM	10:31 PM	7:37:00	26.7	10:31 PM - 6:08 AM
Tuesday, January 16, 2024	4:43 PM	6:37 PM	6:07 AM	8:01 AM	11:08 AM	11:53 PM	6:14:00	37.8	11:53 PM - 6:07 AM
Wednesday, January 17, 2024	4:45 PM	6:38 PM	6:07 AM	8:00 AM	11:25 AM	1:14 AM	4:53:00	49.3	1:14 AM - 6:07 AM
Thursday, January 18, 2024	4:46 PM	6:39 PM	6:06 AM	7:59 AM	11:45 AM	2:35 AM	3:31:00	60.6	2:35 AM - 6:06 AM
Friday, January 19, 2024	**4:48 PM**	**6:41 PM**	**6:05 AM**	**7:58 AM**	**11:42 AM**	**3:55 AM**	**2:10:00**	**71.1**	**3:55 AM - 6:05 AM**
Saturday, January 20, 2024	**4:49 PM**	**6:42 PM**	**6:05 AM**	**7:57 AM**	**12:12 PM**	**5:12 AM**	**0:53:00**	**80.3**	**5:12 AM - 6:05 AM**
Sunday, January 21, 2024	4:51 PM	6:43 PM	6:04 AM	7:56 AM	12:46 PM	6:20 AM	0:00:00	88.0	None
Monday, January 22, 2024	4:52 PM	6:45 PM	6:03 AM	7:55 AM	1:33 PM	7:15 AM	0:00:00	93.9	None
Tuesday, January 23, 2024	4:54 PM	6:46 PM	6:02 AM	7:54 AM	2:31 PM	7:58 AM	0:00:00	97.8	None
Wednesday, January 24, 2024	4:55 PM	6:47 PM	6:02 AM	7:53 AM	3:38 PM	8:29 AM	0:00:00	97.8	None
Thursday, January 25, 2024	4:57 PM	6:49 PM	6:01 AM	7:52 AM	4:49 PM	8:52 AM	0:00:00	99.7	None
Friday, January 26, 2024	**4:59 PM**	**6:50 PM**	**6:00 AM**	**7:51 AM**	**6:01 PM**	**9:10 AM**	**0:00:00**	**99.5**	**None**
Saturday, January 27, 2024	**5:00 PM**	**6:51 PM**	**5:59 AM**	**7:49 AM**	**7:11 PM**	**9:25 AM**	**0:20:00**	**97.4**	**6:51 PM - 7:11 PM**
Sunday, January 28, 2024	5:02 PM	6:53 PM	5:58 AM	7:48 AM	8:19 PM	9:37 AM	1:26:00	93.4	6:53 PM - 8:19 PM
Monday, January 29, 2024	5:03 PM	6:54 PM	5:57 AM	7:47 AM	9:26 PM	9:49 AM	2:32:00	87.9	6:54 PM - 9:26 PM
Tuesday, January 30, 2024	5:05 PM	6:55 PM	5:56 AM	7:46 AM	10:33 PM	10:01 AM	3:38:00	81.0	6:55 PM - 10:33 PM
Wednesday, January 31, 2024	5:07 PM	6:57 PM	5:54 AM	7:44 AM	11:41 PM	10:14 AM	4:44:00	72.9	6:57 PM - 11:41 PM

Vancouver **Total** **169:14:00**

Date - February 2024 (UT -8)	Sunset	Twilight ends	Twilight begins	Sunrise	Moonrise	Moonset	Hrs Dark	Moon %	Prime time
Thursday, February 1, 2024	5:08 PM	6:58 PM	5:53 AM	7:43 AM	12:52 AM	10:30 AM	5:54:00	63.9	6:58 PM - 12:52 AM
Friday, February 2, 2024	**5:10 PM**	**7:00 PM**	**5:52 AM**	**7:41 AM**	**2:06 AM**	**10:50 AM**	**7:06:00**	**54.0**	**7:00 PM - 2:06 AM**
Saturday, February 3, 2024	**5:12 PM**	**7:01 PM**	**5:51 AM**	**7:40 AM**	**3:23 AM**	**11:18 AM**	**8:22:00**	**43.8**	**7:01 PM - 3:23 AM**
Sunday, February 4, 2024	5:13 PM	7:03 PM	5:50 AM	7:38 AM	4:39 AM	11:57 AM	9:36:00	33.4	7:03 PM - 4:39 AM
Monday, February 5, 2024	5:15 PM	7:04 PM	5:48 AM	7:37 AM	5:49 AM	12:54 PM	10:44:00	23.5	7:04 PM - 5:48 AM
Tuesday, February 6, 2024	5:17 PM	7:06 PM	5:47 AM	7:35 AM	6:46 AM	12:53 PM	10:41:00	14.4	7:06 PM - 5:47 AM
Wednesday, February 7, 2024	5:18 PM	7:07 PM	5:46 AM	7:34 AM	7:29 AM	2:07 PM	10:40:00	7.1	7:07 PM - 5:46 AM
Thursday, February 8, 2024	5:20 PM	7:08 PM	5:44 AM	7:32 AM	7:59 AM	3:34 PM	10:36:00	2.2	7:08 PM - 5:44 AM
Friday, February 9, 2024	**5:22 PM**	**7:10 PM**	**5:43 AM**	**7:30 AM**	**8:22 AM**	**5:06 PM**	**10:33:00**	**0.2**	**7:10 PM - 5:43 AM**
Saturday, February 10, 2024	**5:24 PM**	**7:11 PM**	**5:41 AM**	**7:29 AM**	**8:41 AM**	**6:38 PM**	**10:30:00**	**1.4**	**7:11 PM - 5:41 AM**
Sunday, February 11, 2024	5:25 PM	7:13 PM	5:40 AM	7:27 AM	8:57 AM	8:07 PM	9:33:00	5.9	8:07 PM - 5:40 AM
Monday, February 12, 2024	5:27 PM	7:14 PM	5:38 AM	7:25 AM	9:12 AM	9:33 PM	8:05:00	13.0	9:33 PM - 5:38 AM
Tuesday, February 13, 2024	5:29 PM	7:16 PM	5:37 AM	7:24 AM	9:29 AM	10:58 PM	6:39:00	22.3	10:58 PM - 5:37 AM
Wednesday, February 14, 2024	5:30 PM	7:18 PM	5:35 AM	7:22 AM	9:49 AM	12:21 AM	5:14:00	32.9	12:21 AM - 5:35 AM
Thursday, February 15, 2024	5:32 PM	7:19 PM	5:33 AM	7:20 AM	10:13 AM	1:44 AM	3:49:00	44.1	1:44 AM - 5:33 AM
Friday, February 16, 2024	**5:34 PM**	**7:21 PM**	**5:32 AM**	**7:18 AM**	**10:46 AM**	**3:03 AM**	**2:29:00**	**55.2**	**3:03 AM - 5:32 AM**
Saturday, February 17, 2024	**5:35 PM**	**7:22 PM**	**5:30 AM**	**7:17 AM**	**11:28 AM**	**4:14 AM**	**1:16:00**	**65.8**	**4:14 AM - 5:30 AM**
Sunday, February 18, 2024	**5:37 PM**	**7:24 PM**	**5:28 AM**	**7:15 AM**	**11:26 AM**	**5:13 AM**	**0:15:00**	**75.4**	**5:13 AM - 5:28 AM**
Monday, February 19, 2024	5:39 PM	7:25 PM	5:27 AM	7:13 AM	12:23 PM	5:59 AM	0:00:00	83.6	None
Tuesday, February 20, 2024	5:40 PM	7:27 PM	5:25 AM	7:11 AM	1:27 PM	6:33 AM	0:00:00	90.4	None
Wednesday, February 21, 2024	5:42 PM	7:28 PM	5:23 AM	7:09 AM	2:37 PM	6:58 AM	0:00:00	95.4	None
Thursday, February 22, 2024	5:44 PM	7:30 PM	5:21 AM	7:07 AM	3:49 PM	7:17 AM	0:00:00	98.6	None
Friday, February 23, 2024	**5:45 PM**	**7:31 PM**	**5:19 AM**	**7:05 AM**	**5:00 PM**	**7:32 AM**	**0:00:00**	**98.6**	None
Saturday, February 24, 2024	**5:47 PM**	**7:33 PM**	**5:18 AM**	**7:03 AM**	**6:08 PM**	**7:45 AM**	**0:00:00**	**99.9**	None
Sunday, February 25, 2024	5:48 PM	7:35 PM	5:16 AM	7:01 AM	7:16 PM	7:57 AM	0:00:00	99.3	None
Monday, February 26, 2024	5:50 PM	7:36 PM	5:14 AM	6:59 AM	8:23 PM	8:08 AM	0:47:00	96.9	7:36 PM - 8:23 PM
Tuesday, February 27, 2024	5:52 PM	7:38 PM	5:12 AM	6:57 AM	9:31 PM	8:21 AM	1:53:00	92.7	7:38 PM - 9:31 PM
Wednesday, February 28, 2024	5:53 PM	7:39 PM	5:10 AM	6:55 AM	10:40 PM	8:35 AM	3:01:00	86.8	7:39 PM - 10:40 PM
Thursday, February 29, 2024	5:55 PM	7:41 PM	5:08 AM	6:53 AM	11:52 PM	8:53 AM	4:11:00	79.5	7:41 PM - 11:52 PM

Vancouver **Total** **141:54:00**

Members' Gallery

Flame, Horsehead, Great Orion, and Running Man Nebulae by Kai Hui

December 2023 was filled with many rainy days and nights. Fortunately, we had two partial nights when the clouds parted to reveal one of my much-anticipated targets since I started this hobby! However, it was also an almost full moon...These are my first attempt after starting astrophotography in mid 2023. The images were taken with a 103mm, 700mm focal length refractor with a one-shot color camera and light pollution filter. Both images taken from my Bortle 7 backyard in Coquitlam. The first image is the ngc 2024 Flame Nebula, B33 Horsehead Nebula, and IC434 in the constellation Orion. Total exposure time was approximately 5 hours. The second image is of the M42 Great Orion Nebula and ngc 1977 Running Man Nebula, also in the Orion constellation. Total exposure was 100 minutes. I hope to continue to improve imaging and processing over the coming years!

SH2-188 Planetary Nebula (aka “Shrimp Nebula”) by Rick Schneider

SH2-188 is a very cool planetary, with its fast moving central star (white dwarf) moving at about 125 km/sec relative to the Interstellar medium (ISM). Planetaries normally have a generally spherical shell of gas surrounding the central star. However, the rapid movement of SH2-188 relative to the ISM creates a bow shock wave (the bright crescent) in the direction of its travel through the ISM. Taken over multiple short imaging sessions in November and December, 2023 - in gaps in the very miserable weather we are having this fall.