Nova Notes

The Newsletter of the Halifax Centre of the Royal Astronomical Society of Canada

PO Box 31011 Halifax, Nova Scotia, Canada B3K 5T9 www.halifax.rasc.ca halifax@rasc.ca

Messier and More! Edition

Highlights

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Main Photo:
Urban M42, Orion Nebula
27 February, 2022
by Blair MacDonald

Thumbnails (l-r):
St. Croix Observatory
drawing by
Mary Lou Whitehorne

Nova Scotia Northern Lights
31 March 2022
by Jason Dain

Halifax Centre Logo

From the Editor

Ahhh clouds, I know thee well! It seems like the opportunities to look at the night sky come too few and far between, but luckily, there's always something to do in this hobby! Whether it is reprocessing old data, reading up on the latest missions, or just planning ahead, there is always something to keep the interest going.

The cloudy-night conversation in our home has recently turned to plans for 2024 and the Eclipse. In 2017, Rob and I talked about going to Vermont for the eclipse, which made sense at the time. But now, we have so many like-minded and passionate friends in the hobby, we have shifted the conversation to planning on being with friends for the big event. That is a sign of what this hobby is all about, the people.

I've said it before, as editor, I have an easy job, being able to showcase the people of Halifax Centre! When I issued the challenge to show me your Messiers, you delivered! Thank you. Even despite cloudy nights, that just made for a reprocessing challenge.

President Judy Black got out her pencils and sketched, making for an interesting way to present her interpretation (and it made me think outside the box from my normal way of thinking!)

Photo-wise, we have representation from beginners like Jaime Whynot and myself to the very skilled and talented David Hoskin, Jason Dain and Blair MacDonald.

We even have our very own resident author, John Read, who recently "wrote the book" (quite literally) on Messier's Catalog.

One challenge, many ways of sharing! Thanks for making it easy, fellow RASCals.

Also, be sure to check out the Member Mentions section to see what Halifax Centre members are up to outside of club hours! I won't spoil the surprise… you'll need to read for yourselves!

Of course, Paul Heath continues to delight with his poetry and Tony McGrath gives us reading motivation for those cloudy nights.

Last but not least, many many thanks to John McPhee for his eagle eyes and copy editing skills. I like to say he does all the heavy lifting.

See, I told you I have the easy job in all this! THANK YOU ALL!

Wishing you clear skies!

Lisa

Meeting Dates for 2022

- **May 7, 2022:** Randy Attwood (2024 Total Eclipse)
- **June 4, 2022:** Karim Jaffer + Youth (Remote Telescopes and Youth Science)
- **September 10, 2022 (Labour Day = Sept 5)**
- **October 1, 2022 (Thanksgiving = Oct 10)**
- **November 5, 2022:** Marcin Sawicki, SMU (NIRISS – Near InfraRed Imager & Slitless Spectograph)
- **December 3, 2022**

In lieu of a face-to-face meeting, we will now be hosting Members' Meetings using Zoom. You do not require a Zoom account to join in but you are required to register for this webinar. The webinar is limited to 100 registrants - first come, first served. The panelists' presentations are being recorded and will become accessible via a link on YouTube. For more information, please visit https://halifax.rasc.ca/index.php/activities/rasc-events

More to come regarding the 2022 schedule!

For past meeting replays, visit our YouTube Channel
https://www.youtube.com/c/raschalifax

St. Croix Observatory

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix, N.S. The site has expanded over the last few years and includes a roll-off roof observatory with electrical outlets, a warm-room, and washroom facilities. We welcome you to bring your own equipment or to use the Centre's 400-mm Dobsonian telescope,100-mm binoculars, and the recently acquired SCT and gear for astro-imaging.

Enjoy dark pristine skies far away from city lights and the company of like-minded observers searching out those faint "fuzzies" in the night. Most clear Moon-free nights, you will find our keen observers out there! Announcements of members visiting SCO are made on the Centre's Discussion List. If you are not a key holder and would like to become one or need more information, please contact the SCO Manager, John Liddard at scomanager@halifax.rasc.ca.

SCO is Open!

Go to our website (https://halifax.rasc.ca) for the latest SCO usage guidelines.

St. Croix Observatory drawing by Mary Lou Whitehorne

Halifax RASC Board of Directors, 2022

Elected	
President (Also Appointed: National Council Representative; Chair, Governance Committee)	Judy Black
Vice-President	Patrick Kelly
Secretary (Also Appointed: Chair, Nominating Committee)	Peter Hurley
Treasurer	Gregg Dill
Director	Tim Doucette
Director	Matthew Dyer
Director	Paul Heath
Director	David Hoskin
Director	Kathy Walker
Director	Jaime Whynot
Appointed	
Honorary President	Mary Lou Whitehorne
Auditor (2021-2022)	Dave Lane
Dark-Sky Preserve Committee, Co-Chair	Peter Hurley
Dark-Sky Preserve Committee, Co-Chair	Tony Schellinck
Librarian	Jerry Black
Nova Notes, Editor	Lisa Ann Fanning
Nova Notes, Copy Editor	John McPhee
St. Croix Observatory, Manager	John Liddard

Nova East Star Party

SAVE THE DATE FOR 2022!

August 26-28, 2022

(New Moon August 27 @ 5:17 AM)

A Message from the President

Look Up! The Sky is Open!

Over the past few years, you have heard me verbalize and print these phrases numerous times. They are the words of the character Amelia Wren in the 2019 movie *The Aeronauts* that I viewed in 2020. With the pandemic, looking up at open skies seemed like a logical thing to do and it became the saving grace for many of us. We escaped from our four walls of captivity to look out at our *friends* out there in our universe – the stars, nebulae, planets, galaxies, our Sun and Moon.

I think we can all agree the past month or more has not been the best for observing or imaging. As one member said about our continuously cloudy skies, "It's difficult to see the sky through the concrete." However, with summer soon here, there will be plenty of opportunities (fingers crossed) for us to do just that – and hopefully with fellow RASC astronomers!

Here's some good news! Because provincial restrictions have lifted, the RASC Halifax Centre is planning its regular schedule of summer events. These will go forward provided the pandemic restrictions are not reinstated. Stay tuned for updates in the months ahead!

- ***Friday, June 10 – SCO 25th Anniversary BBQ:*** Plans are to host an evening BBQ at SCO to commemorate 25 years of operation! Because of the later time it becomes dark (not to mention the flies), an observing session is not planned as part of this event – but members are invited to stay if they wish.

- ***August 19-21 – Kejimkujik Dark-Sky Weekend (DSW):*** Kejimkujik National Park & National Historic Site along with RASC Halifax Centre are organizing another gathering this year. Last year's DSW under COVID restrictions was a success. Thank you to Peter Hurley and Tony Schellinck for working with the National Park to ensure another successful event.

- ***August 26-28 – Nova East Star Party at Smiley's Provincial Park:*** The Nova East Planning Committee has been formed and plans are underway for a pared-down but exciting schedule of events. Attendees will have more opportunity for socializing, napping, and enjoying the stars. Thanks to Gregg Dill, Lisa Ann Fanning, Paul Gray, Melody Hamilton, Pat Kelly, Tony McGrath, Chris Young, and Jaime Whynot for joining me to plan the event.

- ***Friday, September 23 – Annual SCO BBQ:*** A lot fewer flies and dark skies earlier! Join us for the Annual BBQ and group observing session. We've missed the past 2 years but hope to see everyone there this year! There may even be a special presentation (we'll keep you in suspense).

In the upcoming months, there are also many exciting speakers addressing our membership. Topics range from the RASC remote telescope and young scientists (Karim Jaffer, Montreal Centre) to satellites and space debris (Dr. Don Bedard (Ottawa Research Centre) and Jim Johnston to NIRISS (Marcin Sawicki, SMU). Just go to the RASC Halifax Centre's RASC Events for details and how to register for the session. If you have suggestions for presenters or a subject you would like to see addressed, please do get in touch with me or another Board member. Would love to hear from you!

I think you can guess my closing words. But before they are uttered, consider this quote from Diane Ackerman, an American poet, author, and naturalist: "Look at your feet. You are standing in the sky. When we think of the sky, we tend to look up, but the sky actually begins at the earth."

With her suggestion of a lower 'horizon', maybe I need to change my phrase?

(Starting at Your Feet) Look Up! The Sky is Open!
Judy

***Nova Notes*: The Newsletter of the Halifax Centre of the RASC**
PO Box 31011, Halifax, Nova Scotia B3K 5T9
Nova Notes is published five times a year, in February, April, June/July, September/October and December.
The opinions expressed herein are not necessarily those of the Halifax Centre.
Articles on any aspect of astronomy and related activities will be considered for publication.

Centre Members Give Us A Tour Of The Messiers

Note from the editor: I would like to extend my deepest thanks to all who contributed to this challenge! This “tour” not only gives us a look into the Deep Sky Objects (DSO’s) that make up the catalog, but it shows the depth of skill and dedication our members have!

Collectively, the group obtained photos for about one third of the catalog - of course, weather was a big factor in that! We hope you will enjoy!

Urban Filtered M1 by **Blair MacDonald**

Blair writes: “Here is an urban effort to image M1, the Crab Nebula. With the crappy weather we have had here on the Canadian east coast I took advantage of a hole in the clouds to grab a couple of hours of filtered data on this target. The shot really needs about four hours, but the clouds and my work schedule conspired against me. One of the advantages of astrophotography is that this target isn't going anywhere, so I can add more exposure as circumstances permits.”

Urban M3 by **Blair MacDonald**

Blair writes: “Here is a redo of the processing on an urban image taken from my driveway during the province wide COVID-19 lock down. This shot was taken with a 98 percent Moon in the sky slightly less than 45 degrees away.”

Urban M5 by **Blair MacDonald**

Blair writes: “Here is another urban image taken from my driveway during the province wide COVID-19 lock down. This shot was taken looking straight into the worst of my urban light pollution.

M8 Lagoon Nebula in an Esprit 120 by **Blair MacDonald**

Blair writes: “Here is an image of the Lagoon Nebula taken with my SkyWatcher Esprit 120. The conditions were so-so with slightly low transparency and the target was 25 degrees above the horizon at best while the image was taken. The image is a 50% crop of the full image so use your browser's zoom capability to see the full detail.”

Messier 13 by **David Hoskin**

David writes: “Globular star cluster in the constellation Hercules. Messier 13 contains about 300,000 stars and is 22,200 light years from Earth.

Equipment: Celestron 150mm XLT f/5 reflector, ZWO ASI533MC
Pro camera with Optolong L-Pro filter, SkyWatcher EQ6R Pro mount.
Post-processing details: 26 4-minute lights (M13) plus calibration frames were stacked using ImagesPlus; other post-processing used Photoshop CS2 plus Astronomy Tools plugin, Siril, and PhotoScape X.”

Filtered M16 by **Blair MacDonald**

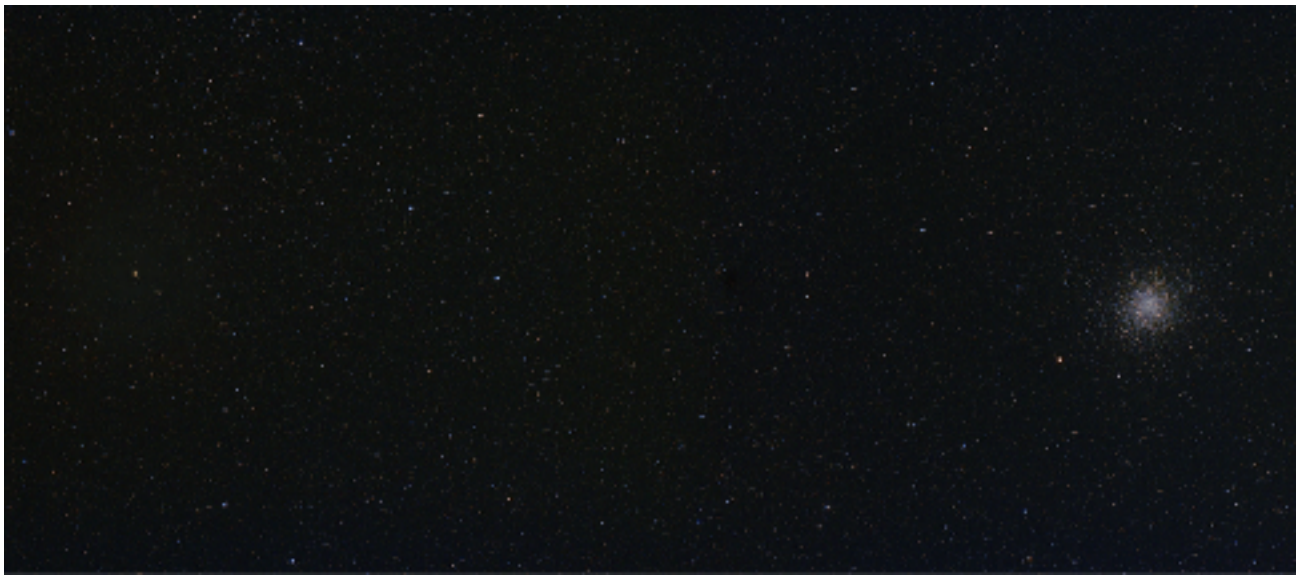
Blair writes: “A summertime favourite M16, also known as the Eagle Nebula, is an emission nebula buried in the summer Milky Way.

M17
by **Blair MacDonald**

Blair writes: “Here is a recent image of M17 taken from the dark skies of our cottage.”

M20 by **Blair MacDonald**

Blair writes: “Here is an image of M20 taken on one of the most *interesting* imaging days I've had at our cottage. From our cottage, M20 hugs the tree line and is buried in light pollution.”



Saturn and M22 in Esprit 120 & Canon 60Da by **Blair MacDonald**

Blair writes: “Sunday morning Saturn passed just over a degree and a half from M22 in Sagittarius. I've been working on some mosaic capture software and this was the first real test. M22 is obvious, but Saturn is a little hard to find. It is the bright elongated star near the centre vertically just in from the left edge of the image.” (May 13, 2018 6:00 AM UTC)

M27 by **Blair MacDonald** Blair writes: “The Dumbbell Nebula (also known as Apple Core Nebula, Messier 27, M 27, or NGC 6853) is a planetary nebula in the constellation Vulpecula, at a distance of about 1227 light-years. This object was the first planetary nebula to be discovered; by Charles Messier in 1764. At its brightness of visual magnitude 7.5 and its diameter of about 8 arc-minutes according to Wikipedia. This shot was captured using an Optolong L-eNhance light pollution filter. The filter darkened the background substantially allowing the very faint outer envelope of the nebula to be pulled out in processing. Unfortunately clouds rolled in and cut the imaging session short so I plan on adding another two hours at my first opportunity so the stretch can be pusher further to brighten the outer envelope.”

M33 with Canon 60Da Reprocess by **Blair MacDonald**

Blair writes: “M33 has always been a nemesis of mine. It seemed that something always went wrong when I'd try to image it, tracking would go haywire, focus would shift or I'd run out of time and have to cut the session short. This image falls into the last category as I had another target in mind and started collecting data only to have it move into an area of light pollution. I thought I'd give M33 another try as it was nice and high in the sky at the time. The total exposure was shorter than I would like so I had to limit the stretch a bit, but it qualifies as my best shot of this object to date. This is the first time I've been able to resolve deep sky targets in this galaxy and it is posted at a higher resolution so use your browser's zoom to take a look around. Targets such as IC132, NGC604, NGC592 and NGC595 are clearly visible and there are many resolved star clusters along the spiral arms with huge super-luminous blue giant stars shining through.”

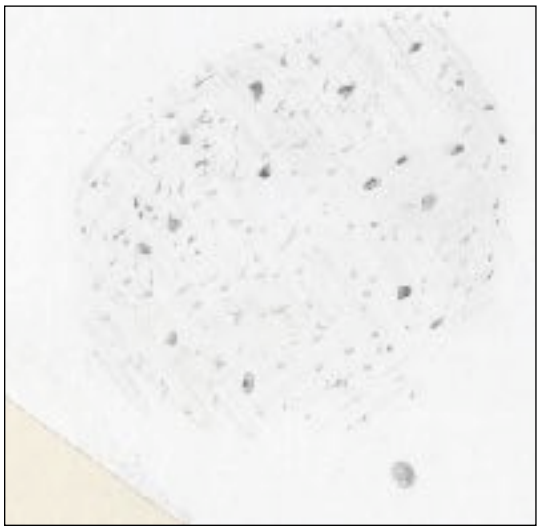
Feature: Messier 35 (NGC 2168)

Text and Sketches by Judy Black
Photo by Jerry Black

Because the Messier Catalogue has only 110 objects in it, one might think it's easy-peasy to complete. It is if you are just looking to “find” them and not “observe” them. As a visual observer, one must recognize that sometimes a dark sky may be needed, especially if you are in the middle of a light-polluted suburb. It may also be a benefit to have younger eyes than mine, especially when attempting to locate faint galaxies.

Messier 35, also known as NGC 2168, is located in the constellation Gemini. It contains both bright and faint stars, is scattered over a true diameter of about 24 light years (about the size of a full Moon), and is approximately 2,970 ly away. The estimated age is about 110 million years.

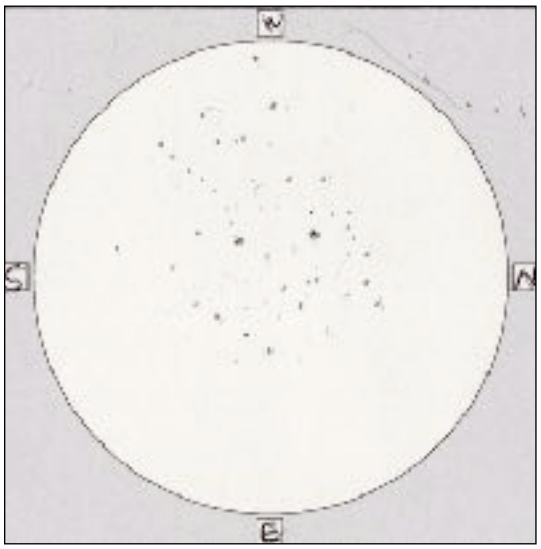
On May 5, 2018, I had my first look at this beauty while under the stars at SCO. Then came April 2022 in our backyard. Two observations. Two telescopes. Two different nights.



April 2:
Time: 10:30 PM ADT
Conditions: Windy with gusts (cold), no clouds. 1º C. SQM: 19.55
Equipment: 6” Dobsonian with 40 mm TeleVue eyepiece (x30 mag).

Jerry and I were looking for Messier objects - me to visually observe (outside), him to image (inside). Gemini was high above our trees as was most of Orion. I followed Castor's stars to his foot to find M35. Many bright stars were visible with too many to count in the diffuse background. Bright point south of it that made me wonder if it was NGC 2158 - or was it 1 Geminorum?

And now for a larger aperture.



April 5:
Time: 9:40 PM ADT
Conditions: No wind or clouds. 4º C.
Equipment: 10” Meade SCT, 40 mm Plössl

Jerry and I were once again in our respective locations looking for Messier objects. Gemini held its high position above our trees to the W-SW.
Located Tejat then slewed northerly and lower towards the horizon just a little to find M35. It’s a beautiful cluster with lots of stars. I began my sketch with the two bright central stars. There was a curved line of 5 stars to the east of them. Seven stars that went SW then 2 stars to the west looked like a hockey stick with a super huge blade. Didn’t notice nor look for the adjacent NGC 2158.

If you haven’t seen M35 before, this could be an “oh, wow!” moment for you. Happy hunting!

M35 by Jerry Black

Exposure 8*300 sec
ISO 800
Camera Nikon Z7 [8856 x 5504]
Optics Skywatcher Esprit 120mm Refractor
Filter Radian Triad Ultra Quad-Band Narrowband Filter
Dates March 28 and April 3, 2022
Capture Kstars/EKOS Scheduler
Processing PixInsight
Slightly cropped

Jaime Whynot's interpretation of Orion Nebula is proof that the skies are open to everyone. Jaime just recently celebrated her one year anniversary of "observing the night sky in a whole new way," with her Sky-Watcher 200p 8 inch Dobsonian.

10 second exposure using NightCap app, no tracking

Equipment:

- Sky-Watcher 200p 8 inch dobsonian
- 25mm plossl
- iPhone 8 using NexYZ adapter
- Edited using iPhone Photos app

Another entry in the relative "newbie" category…

Lisa Ann Fanning joined RASC Halifax in the Summer of 2020 and began capturing images of the night sky with her iPhone almost instantly. She enjoys educating and encouraging others to try as well.

Urban M51 by **Blair MacDonald**

Another urban image taken from my driveway during the end of our third wave of COVID-19 here in Nova Scotia

The Whirlpool Galaxy, also known as Messier 51a, M51a, and NGC 5194, is an interacting grand-design spiral galaxy with a Seyfert 2 active galactic nucleus. It lies in the constellation Canes Venatici, and was the first galaxy to be classified as a spiral galaxy. Its distance is estimated to be 31 million light-years away from Earth. The galaxy and its companion, NGC 5195 are easily observed by amateur astronomers, and the two galaxies may be seen with binoculars. The Whirlpool Galaxy has been extensively observed by professional astronomers, who study it to understand galaxy structure (particularly structure associated with the spiral arms) and galaxy interactions.

M57
by **Blair MacDonald**

Blair writes: “Here is a recent image taken from our cottage using my new SkyWatcher Esprit 120 APO refractor. The image was taken with a first quarter Moon in the sky.”

M60 and Supernova (SN2022hrs) by **David Hoskin** (April, 2022) - There is a supernova (SN2022hrs) close to Messier 60 in the intermediate spiral galaxy NGC 4647, which is about 63 million light years from Earth. The type 1a supernova was discovered on 16 April 2022 by Koichi Itagaki.
Equipment: Celestron 150mm XLT f/5 reflector, ZWO ASI533MC
Pro camera with Optolong L-Pro filter, SkyWatcher EQ6R Pro mount.
Post-processing details: 29 4-minute lights plus calibration frames were stacked using ImagesPlus; other post-processing used Siril, Photoshop CS2 plus Astronomy Tools plugin, PhotoScape X, and MS Photo.

M63 by **David Hoskin**

David writes: “In spite of increased sky glow from a waxing crescent Moon, I was able to image another galaxy last night before clouds appeared soon after midnight. This is Messier 63, also known as the Sunflower Galaxy. It is a flocculent spiral galaxy, so named because of its lack of defined spiral arms. Messier 63 is located in the constellation Canes Venatici and is about 27 million light years from Earth.

Equipment: Celestron 150mm XLT f/5 reflector, ZWO ASI533MC
Pro camera with Optolong L-Pro filter, SkyWatcher EQ6R Pro mount.
Post-processing details: 35 4-minute lights plus calibration frames were stacked using DeepSkyStacker; other post-processing used Siril, Photoshop CS2 plus Astronomy Tools plugin, PhotoScape X, and MS Photo.”

Messier 64 by **David Hoskin**

David writes: “The Black Eye Galaxy, is notable for the band of dust that partially obscures the bright nucleus. This spiral galaxy is located in the constellation Coma Berenices and is about 17 million light years from Earth.

Equipment: Celestron 150mm XLT f/5 reflector, ZWO ASI533MC
Pro camera with Optolong L-Pro filter, SkyWatcher EQ6R Pro mount.
Post-processing details: 25 4-minute lights collected over 2 nights plus calibration frames were stacked using ImagesPlus; other post-processing used Siril, Photoshop CS2 plus Astronomy Tools plugin, PhotoScape X, and MS Photo.”

Leo Triplet including M65 and M66 by **David Hoskin**

David writes: “The Leo Triplet is a small group of galaxies in the constellation Leo comprised of Messier 65, Messier 66, and NGC 3628. All are spiral galaxies that are about 35 million light years from Earth.

Equipment: Celestron 150mm XLT f/5 reflector, ZWO ASI533MC
Pro camera with Optolong L-Pro filter, SkyWatcher EQ6R Pro mount.
Post-processing details: 15 4-minute lights plus calibration frames were stacked using ImagesPlus; other post-processing used Photoshop CS2 plus Astronomy Tools plugin, Siril, and PhotoScape X.”

M67 by **David Hoskin**

David writes: “The Moon is at 1st quarter, getting to bright for imaging fainter targets, so I imaged Messier 67 (Golden Eye Cluster/King Cobra Cluster). To my dismay, most subs were not usable due to intermittent clouds messing up my guiding. Fortunately, I found some unprocessed M67 data from October 2019 so I got my image of M67 after all!”

M81 by **Blair MacDonald**

Blair writes: “My schedule and the weather finally aligned with the dark of the Moon and I managed to get some time at the St.Croix Observatory, the dark sky observing site of the Halifax Centre of the RASC. After setting up and finding that my intended target was still behind the trees I took the opportunity to grab a couple of hours of data on a favourite galaxy pair. The image really needs about 4 to 6 hours to do the integrated flux nebula (IFN) any justice, but it is a tribute to the dark skies at the site that it was visible in such a short exposure.”

M94 - Cat's (or Croc's) Eye Galaxy by **David Hoskin**

“a spiral galaxy located 16 million light years from Earth.”

M96 & Friends with Esprit 120 & Canon 60Da by **Blair MacDonald**

Blair writes: “Here is an interesting field surrounding M96. M95 is in the upper right while M105 is the elliptical on the left. NGC3384 is the furthest galaxy to the left and is cut off by the edge of the frame. NGC3373 is just below NGC3384.”

M97 - the Owl Nebula
by **David Hoskin**

M101
by **Blair Macdonald**

Blair writes: “This is a redo of the processing of used on data captured in 2014 at SCO, the dark sky observatory of the Halifax Centre of the RASC. The original version is here.

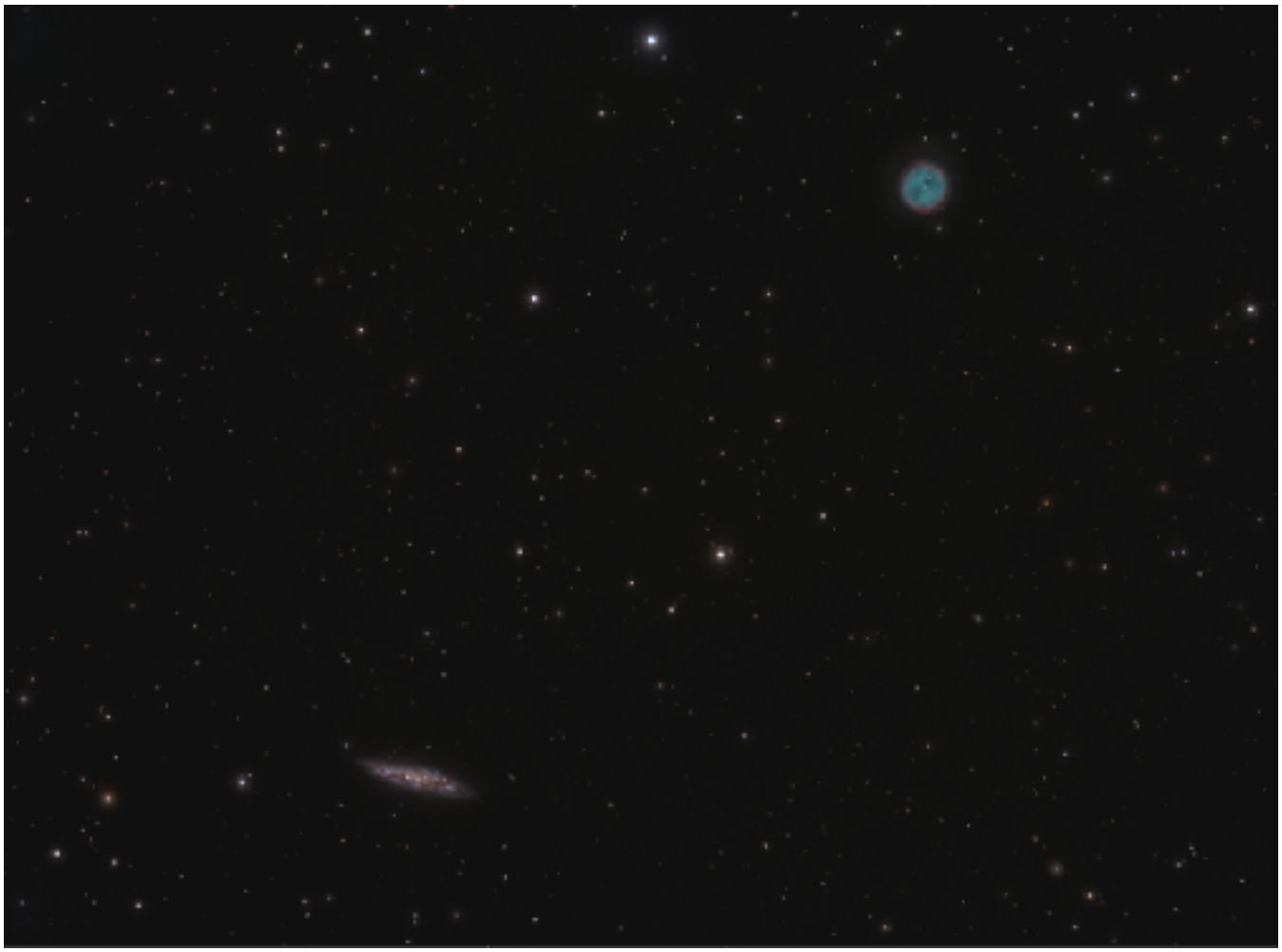
According to Wikipedia - The Pinwheel Galaxy (also known as Messier 101, M101 or NGC 5457) is a face-on spiral galaxy 21 million light-years (6.4 megaparsecs) away from Earth in the constellation Ursa Major. It was discovered by Pierre Méchain in 1781 and was communicated that year to Charles Messier, who verified its position for inclusion in the Messier Catalogue as one of its final entries.”

M104, the Sombrero Galaxy
By David Hoskin

“an unbarred spiral galaxy
in Virgo seen edge-on”

M106 by **Jason Dain**

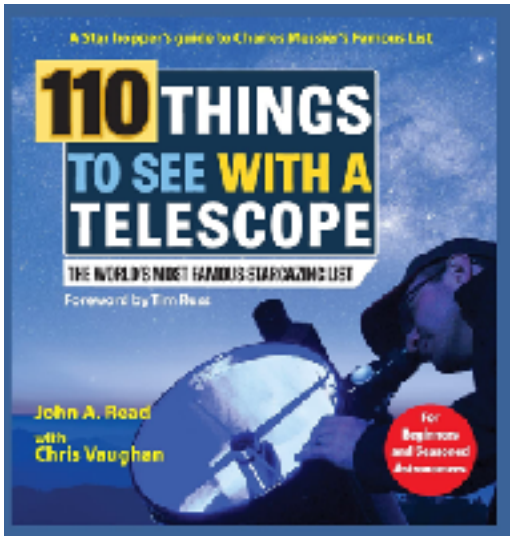
Jason writes: “Thanks to Blair MacDonald on this one for helping me with some noise reduction issues I was seeing.
Captured from my Bortle 4 backyard west of Halifax NS
Exposure: 6 hrs of 180s exposures at f/5.5 Gain 100
Telescope: Skywatcher Esprit 100 ED APO Refractor
Imaging Camera: ZWO ASI2600MC Pro
Guiding: ASI120MM Guide camera on 50mm Skywatcher EVOGuide Scope Filter: None.
Mount: Skywatcher EQ6R-Pro
Calibration: 30 flats and flat darks taken during twilight
Hardware Control: ASIAIR Pro, Pegasus Power Box and ZWO EAF
Processing: The selected images were pre-processed and processed using Pixinsight.”



Urban M108 by **Blair MacDonald**

Blair writes: “This image was a bit of a new camera test taken to see how my new Zwo camera works under urban conditions. I've used the camera here in the city with an Optolong L-eNhance filter, but I wanted to see if the combination of extremely low noise and reasonably good full well depth would allow unfiltered imaging of galaxies. This image was captured partially under an almost full Moon from my Bortle 6/7 urban driveway. I've added two more hours of exposure to this one to bring out more detail.”

Note: To see more of Blair’s work, visit http://www.nightanddayastrophotography.com



Have these images piqued your curiosity? Want to learn more about Messier’s Catalog?

RASC Halifax Centre Member and 2020 RASC Simon Newcomb Award recipient for excellence in science communication, **John Read** recently published *110 Things To See With A Telescope* along with fellow RASC member, Chris Vaughan. Check it out where books are sold!

As of April, 2022, this book is ranked on Amazon.ca

- #2 in Telescopes (Books)
- #11 in Star Gazing (Books)
- #21 in Science & Technology Teaching Materials

Observing and Imaging Ceres, Smallest of the Dwarf Planets

By David Hoskin

Mention “dwarf planet” and most people will immediately think of frigid Pluto at the far reaches of our solar system; however, there is one dwarf planet that is far closer to Earth and easily seen as a star-like point of light with hand-held binoculars or a small telescope. This nearby dwarf planet is Ceres (minor planet designation: 1 Ceres), which spends its time near the middle of the asteroid belt between the orbits of Mars and Jupiter.

Named after the Roman goddess of agriculture, Ceres was discovered quite by accident on 1 January 1801 by Giuseppi Piazzi, a Catholic priest at the Academy of Palmero in Sicily who was searching for a particular “zodiacal star”. Although Ceres was initially believed to be a planet, it was in fact the first asteroid to be discovered and as such was designated an asteroid in 1850, following the discovery of many other celestial objects with similar orbits. In 2006 Ceres was reclassified as a dwarf planet because Ceres meets the following criteria. It orbits the Sun, has sufficient mass and therefore gravity to maintain a spherical shape, is not a satellite, and has not cleared the neighbourhood of its orbit.

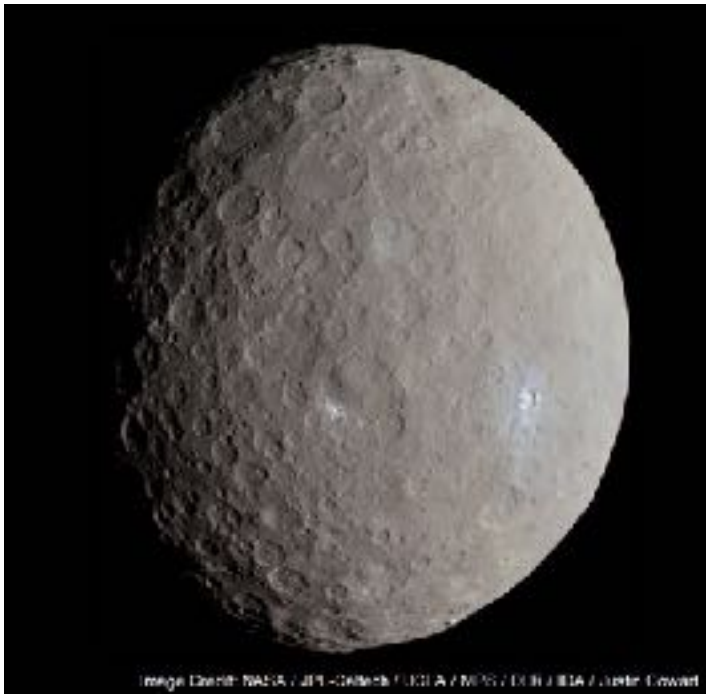


Figure 1. Ceres photographed by the Dawn spacecraft.

Ceres is the largest object in the asteroid belt, comprising about 25% of the total mass of the entire asteroid belt. However, Ceres is the smallest of the dwarf planets with a radius of only 476 kilometres. Compare this with Pluto, the largest of the dwarf planets with a diameter of about 2380 kms and a mass 14 times that of Ceres. It takes 9 hours and 4 minutes for Ceres to complete one rotation on its axis and 4.6 Earth years for Ceres to complete one orbit around the Sun. The geology of Ceres is most like that of the inner planets, albeit much less dense, being made up mostly of ice, rock, and clay. In 2015 Ceres was visited by the Dawn space probe, which captured detailed images of the dwarf planet’s surface (Figure 1). Ceres is covered with many small craters, some of which are always in shadow and may contain ice. In fact, some scientists believe that up to 25% of Ceres could be composed of water, raising the intriguing possibility that this dwarf planet may harbour evidence of life.

Figure 2. Ceres at Opposition in 2021

The apparent magnitude of Ceres varies between 6.7 and 9.3, depending on where the dwarf planet is in its orbit relative to the Earth. Binoculars or a small telescope and a dark sky are therefore necessary to spot Ceres as it moves through its orbit. However, Ceres looks exactly like a star, even at its brightest during opposition and viewed or imaged through a typical backyard telescope (Figure 2).

Figure 3. Apparent Motion of Ceres Over Several Days in 2021

The best way to spot Ceres is to use an app like Stellarium or SkySafari to locate the dwarf planet and its path over time relative to another bright object or star pattern. Then view or image Ceres over several consecutive nights and note how the dwarf planet's location changes as it moves through its

orbit (Figure 3). Of all the dwarf planets in our solar system, only Ceres can be easily seen and imaged with amateur equipment!

References

In Depth | Ceres – NASA Solar System Exploration

Ceres dwarf planet: Amazing facts and information : Planets Education

Let's Get Serious About Ceres - Sky & Telescope - Sky & Telescope (skyandtelescope.org)

Northern Lights Light Up the Sky

by Jason Dain

Jason Dain writes: “I spent a good part of the day watching the Aurora forecast as there was a good chance to see them here in Nova Scotia with the recent solar activity. At around 8:30 pm or so, I went out on my deck and noticed some hazy clouds to the north and thought they looked a bit odd. I quickly setup my camera in the backyard and captured this image. After this, I grabbed my gear and went to a darker location but alas, the show was over for the night. I'm super excited I was able to capture this picture. This week may provide some additional opportunities for us to see the Northern Lights as the sun has been very active lately.

This is a single 10 second exposure at f/2, ISO1600 with my Nikon Z6ii and Rokinon 24mm f/1.4 lens on a tripod. I processed the image in Photoshop to bring out the details. The aurora were visible to the naked eye but not quite this bright.
Stillwater Lake, NS - March 13, 2022”

RASC Halifax Member Mentions
Honours abound for Jason Dain

This beautiful photo of the Northern Lights taken by member **Jason Dain** has received many accolades which should be noted:

NASA's APOD (Astronomy Picture of the Day 2022 April 2)
Caption: "Nova Scotia Northern Lights
Source: https://apod.nasa.gov/apod/ap220402.html
Image Credit & Copyright: Jason Dain
Explanation: This almost otherworldly display of northern lights was captured in clear skies during the early hours of March 31 from 44 degrees north latitude, planet Earth. In a five second exposure the scene looks north from Martinique Beach Provincial Park in Nova Scotia, Canada. Stars of the W-shaped constellation Cassiopeia shine well above the horizon, through the red tint of the higher altitude auroral glow. Auroral activity was anticipated by skywatchers alerted to the possibility of stormy space weather by Sun-staring spacecraft. The predicted geomagnetic storm was sparked as a coronal mass ejection, launched from prolific solar active region 2975, impacted our fair planet's magnetosphere."

Jason Dain recognized by the Nova Scotia House of Assembly

TRANSCRIPT: 22APR08
Source: https://nslegislature.ca/legislative-business/hansard-debates/assembly-64-session-1/house_22apr08

"DAIN, JASON: ASTROPHOTOGRAPHER WORK - CONGRATS.

SUZY HANSEN « » : I rise today to recognize an amazing Halifax Needham resident, Jason Dain. Jason Dain is a local astrophotographer and he's been taking photos of the night sky for two and a half years. He is also a member of the Royal Astronomical Society of Canada. Jason has had his work published nationally and has also had it recognized by NASA on their Astronomy Picture of the Day site twice, including a recent photo of the Northern Lights taken at Martinique Beach.

I would like to congratulate Jason Dain on his recognition as an astrophotographer, and I hope to see many more of his stunning photos in the future."

The Chronicle Herald
Tuesday, March 15, 2022 in Weather
Photo by **Jason Dain**
(Scanned photo of newspaper)

Looking for peace up in the night sky

Nova Notes Co-editor, **John McPhee** was recently mentioned, along with his photo of a crescent moon featured in The Chronicle Herald. Pressreader subscribers can view the article online here: https://www.pressreader.com/canada/the-chronicle-herald-metro/20220226/page/6

Centre member and auditor **Dave Lane** recently did an interview for CTV "Live at 5" yesterday about the daylight saving time debate. The clip can be viewed here:

https://atlantic.ctvnews.ca/video?clipId=2403942&binId=1.1145463&playlistPageNum=1&fbclid=IwAR08dipLW68pXGAMfdpjwIqyDWJ_DNcPXitTJdqr9wPguEzW9yvQBKNu888

Several RASC Halifax Centre members were recently guests on O. Maurice Stewart's Sky Viewer International Podcast (on Facebook.) The podcast is the brainchild of O. Maurice Stewart and a favourite feature of his Facebook group "Sky Viewers International" https://www.facebook.com/groups/231565318956714

Recent RASC Halifax Centre members' interviews can be viewed at the following links:

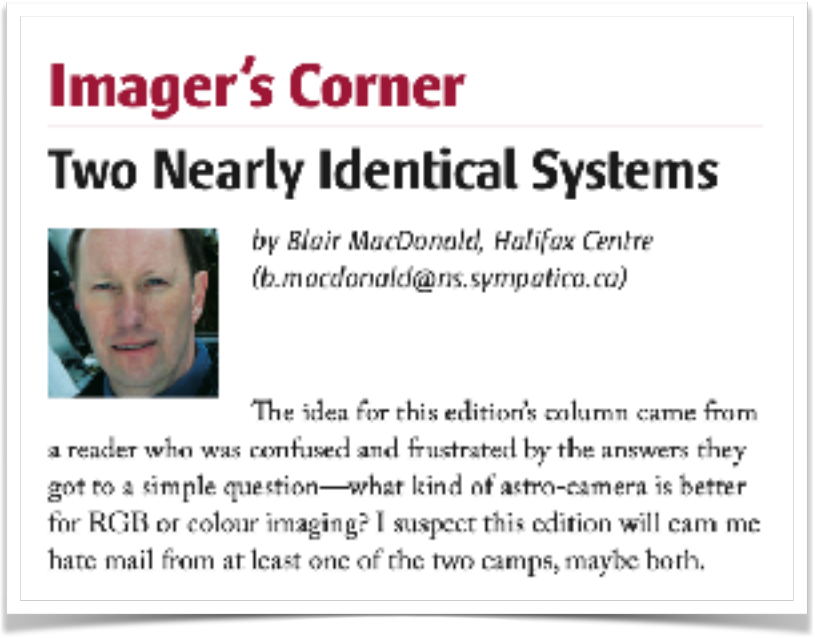
Timothy Doucette	https://www.facebook.com/685935481/videos/1318736251967257/
Lisa Ann Fanning	https://www.facebook.com/685935481/videos/379817750328889/
David Hoskin	https://www.facebook.com/685935481/videos/279406494347727/
John Read	https://www.facebook.com/685935481/videos/358460052665700/

Centre members **Tim Doucette** and **Lisa Ann Fanning** were guests of Montreal Centre's Earth Hour celebration discussing different aspects of light pollution. View the replay here: https://www.youtube.com/watch?v=MX8ggawqQo8

Be sure to check out **Blair MacDonald**'s Imager's Corner in the J*ournal of the RASC (JRASC)*

The April 2022 edition can be found here: https://www.rasc.ca/sites/default/files/publications/jrasc2022-apr-lr.pdf

Much of Blair's amazing work can be found throughout this and other editions of Nova Notes.



Imager's Corner

Two Nearly Identical Systems

by Blair MacDonald, Halifax Centre
(b.macdonald@ns.sympatico.ca)

The idea for this edition's column came from a reader who was confused and frustrated by the answers they got to a simple question—what kind of astro-camera is better for RGB or colour imaging? I suspect this edition will earn me hate mail from at least one of the two camps, maybe both.

The Centre was also well-represented in the past few months on *EarthSky's* media channels.

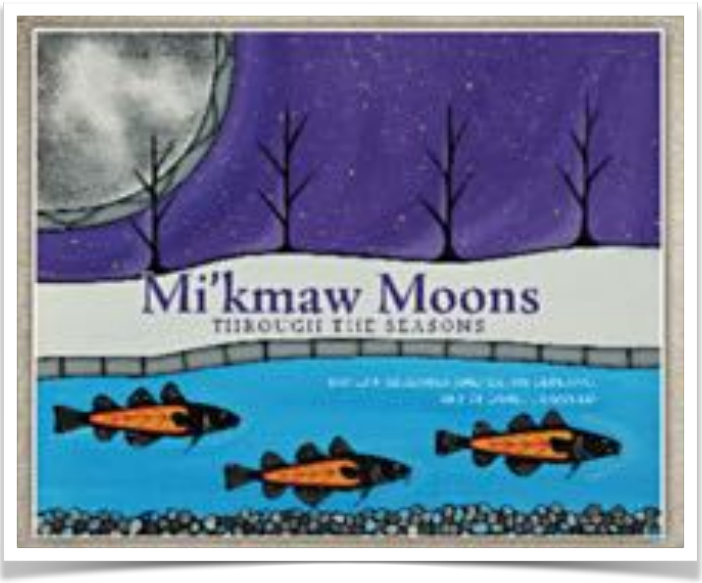
David Hoskin's Community Photo Portfolio continues to grow on EarthSky.com

Here is just a sampling of his recent portfolio. To visit his entire *EarthSky* Community portfolio, and see details of each photo, visit: https://earthsky.org/earthsky-community-photos/?filter_1_3=David&filter_1_6=Hoskin&mode=all

Dave Chapman and the Mi'kmaw Moons project has been busy with the upcoming release of their book:

Mi'kmaw Moons
Through the Seasons
Illustrated by Loretta Gould, By David F. Chapman and Cathy LeBlanc
Formac Publishing

Available 2nd September 2022. For more information or to preorder, visit http://www.formac.ca/Book/3479/Mikmaw-Moons.html?fbclid=IwAR0KHTs_7Np5aVKJDCTD-jqRpaTMn9HRz9sdvDmtGJaJqR8NpRnbZbQzU3A



Lisa Ann Fanning was a guest on Explore Alliance's 90th Global Star Party, themed "Cosmic Flow," hosted by Scott W. Roberts, Founder and President of Explore Scientific.

The show is a weekly star party live streamed over various media, such as Facebook and YouTube, and on Explore Scientific's website.

Lisa discussed her favourite topic to explore these days, *"Moon and Migration."*

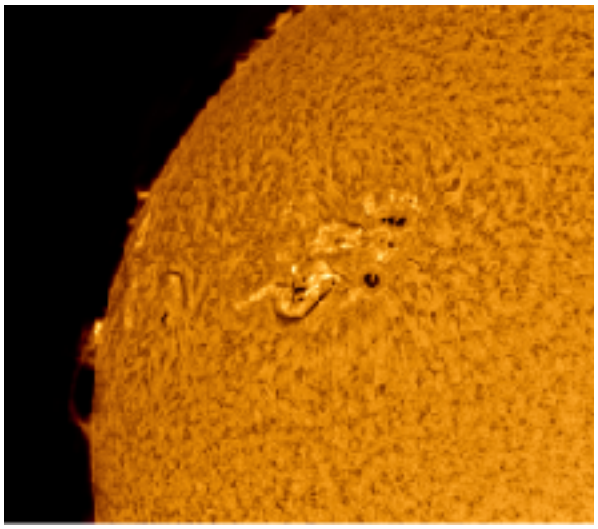
A replay of the episode can be found here: https://youtu.be/l6kLnDvknt0 (For Lisa's segment, visit hour 2:16)

Do you have something you would like to share in an upcoming edition of *Nova Notes*?

Send your photos, poems, articles and other works to

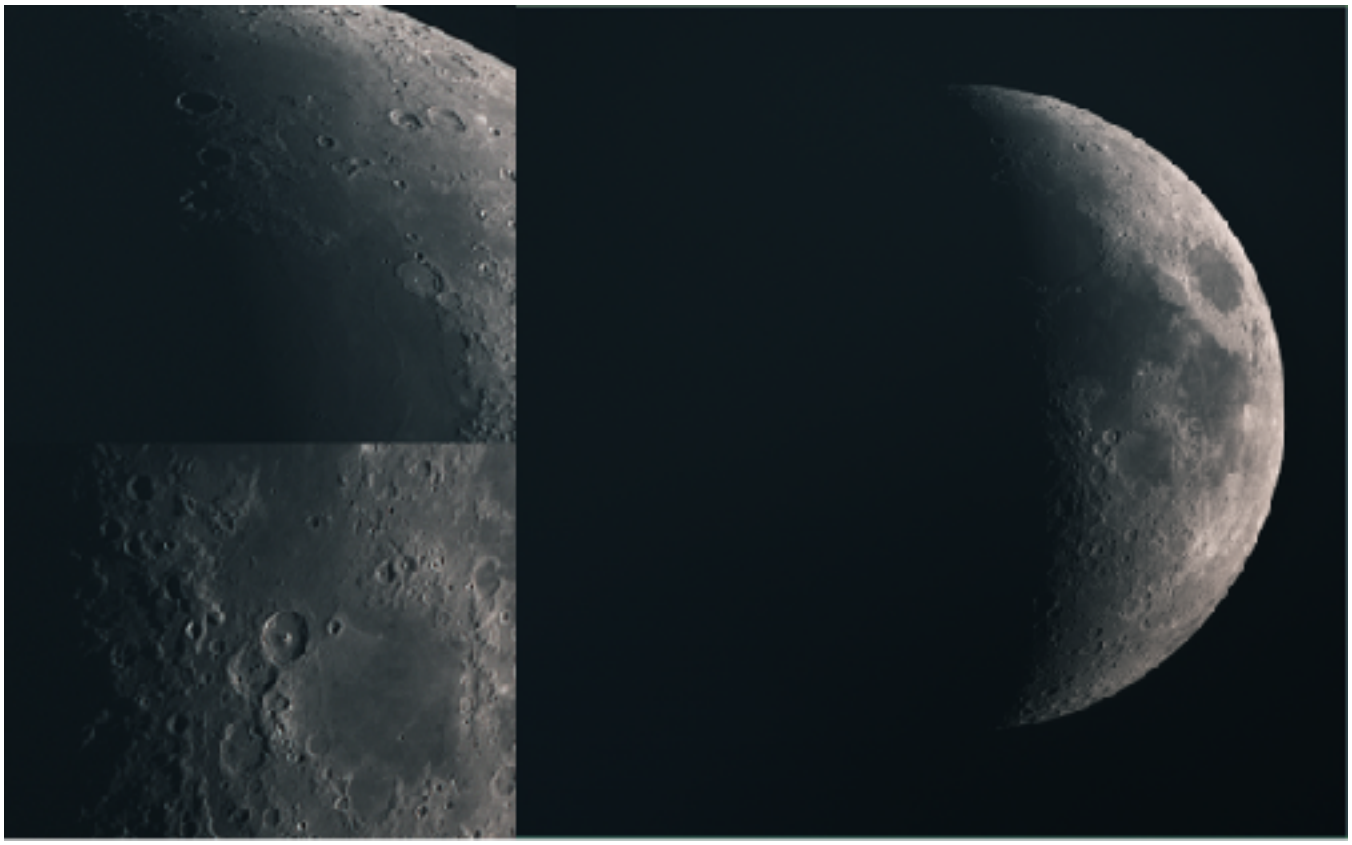
novanoteseditor@halifax.rasc.ca

Members' Universe



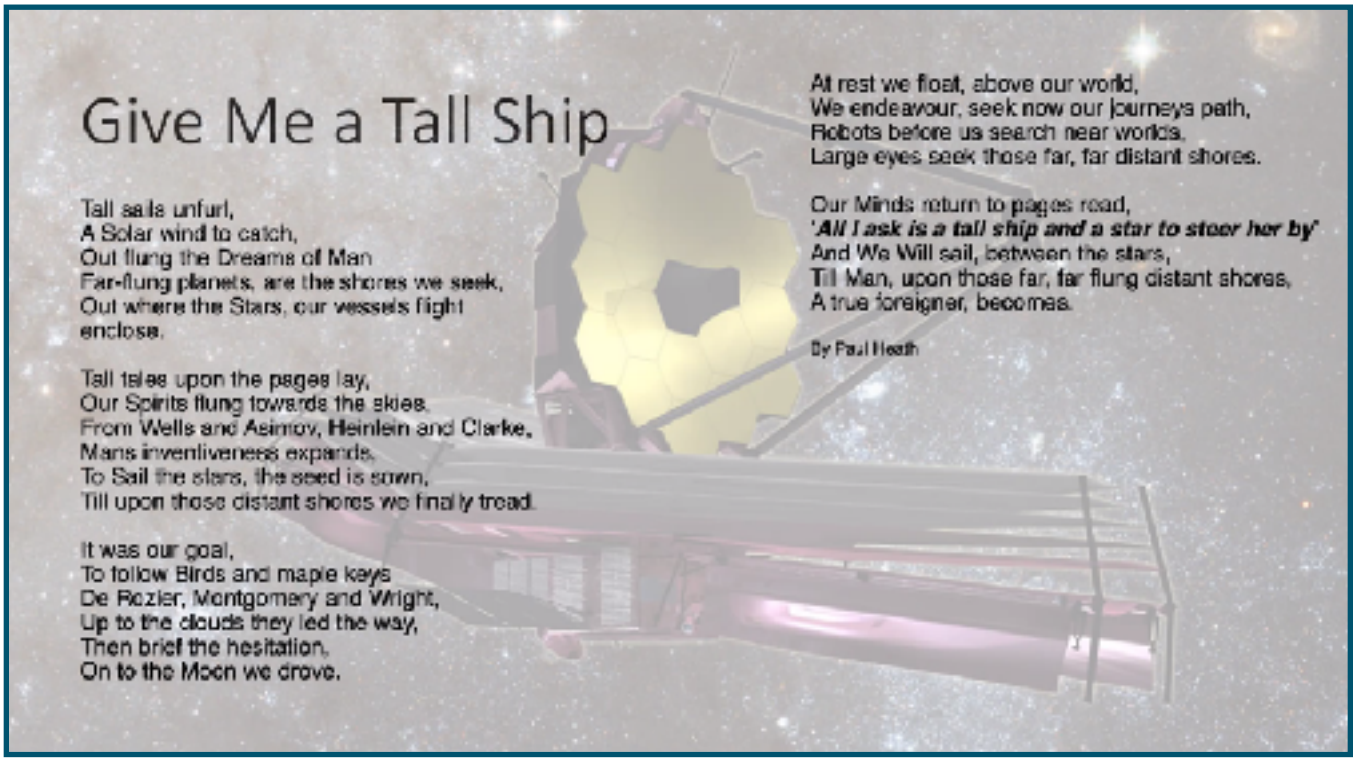
Newly emerged sunspot group AR2995 and the huge sunspot complex AR2993-94 imaged this morning in hydrogen alpha. Prominences, filaments and plage are also visible. **by David Hoskin** (April 20 2022)

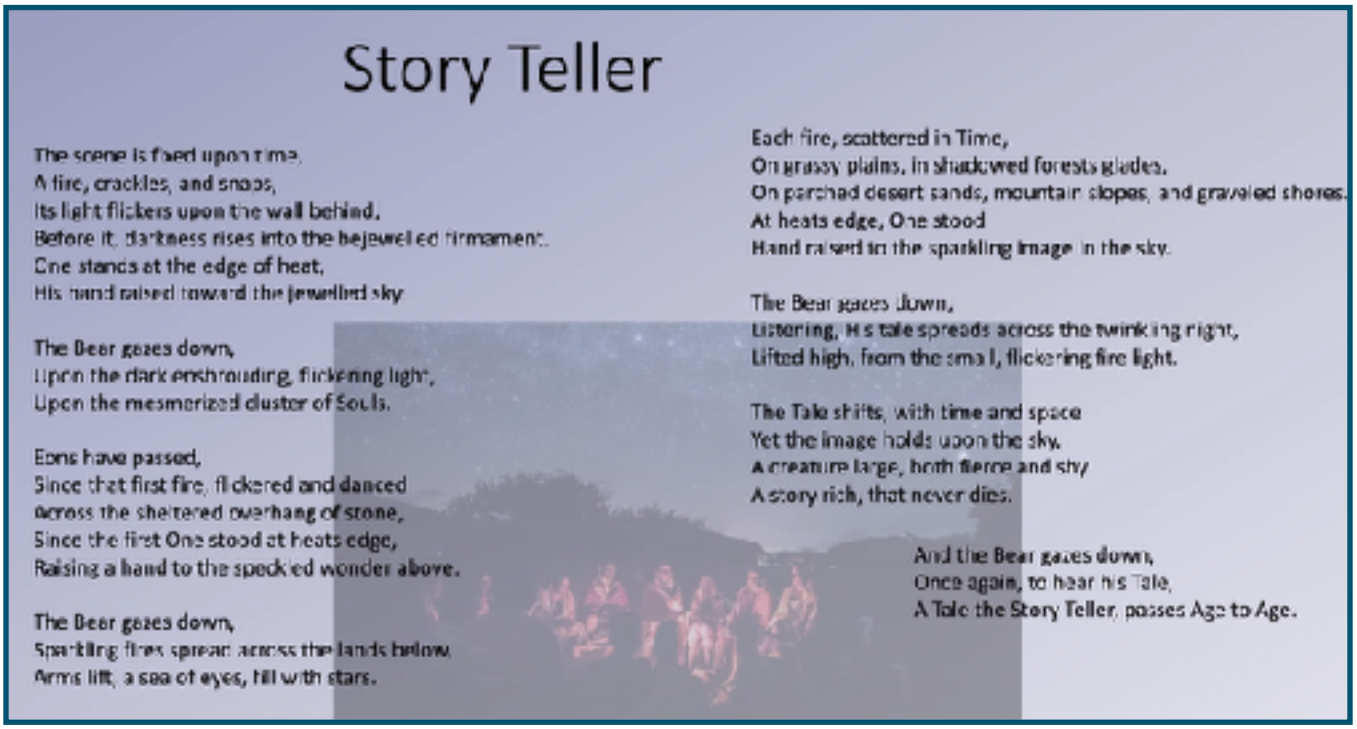
Solar prominence and filament
by David Hoskin (April, 2022)



Waning Crescent Moon and features
by David Hoskin

Food for the Soul: The Poetry of Paul Heath





Book Review: *First Light - Switching on Stars at the Dawn of Time*

Emma Chapman Bloomsbury Sigma 2020

By Tony McGrath

Despite the rapid progress of all branches of astronomy throughout the 20th and into the 21st century, we know very little about the period from 380,000 years to 1,000,000,000 years following the Big Bang. This period is both figuratively and in fact the cosmic dark ages.

Today we observe two types of stars, very creatively named Population I and Population II. The fact that there were two populations of stars was confirmed by Walter Baade in 1944, observing from Mount Wilson under the blacked-out skies of World War II California.

We know that neither of these star populations are primordial, that is to say they could not have formed from the primordial gas, as there are metals in their makeup. Astronomers believe that there must have been primordial stars, those made entirely of Hydrogen and that these stars make up a separate theoretical group referred to as Population III. Emma Chapman's book is an up-to-date description of the case for Population III stars, including efforts at their detection.

These stars would have formed 200,000,000 years after the Big Bang. They would have been big, on the order of 100 to 1,000 solar masses. They were hot, burning at 100,000K versus the suns 5,800K and the lives of the big ones would have been brief. Initially it was thought that they were solitary entities, but recent research suggests they likely formed in groups.

Chapman is a research fellow at Imperial College London engaged in the search for these first stars. Her enthusiasm for the topic shines through in her writing. The book is an interesting read and written in a conversational style. While the topic contains some pretty heady stuff, Chapman does a great job at explaining the astrophysics, bringing it all down to a level the general reader can understand. The narrative takes you along for a discussion of the three epochs that define the construction and lifetime of the first stars…the Dark Ages, the Cosmic Dawn and the Epoch of Reionisation.

Are there any Pop III stars around today? For a Population III star to have survived to present day, it would have to been around 80 solar masses or less. This is on the low end of viability for Population III, however simulations suggest that stars of this low mass were created. It is a long shot to try and detect any of these first stars directly, since if they exist, they are likely mixed in thoroughly with Population I and II stars. Research efforts are directed not at detecting the stars themselves but looking for the signatures they will have left behind upon their demise…either supernovae or direct collapse black holes (DCBH).

The JWST is ideally placed for the supernovae search, and while the existing LIGO gravitational wave observatory can detect gravitational waves, it is not large enough to detect the wavelengths of gravitational waves associated with colliding DCBH. The instrument planned for this job is a space-based observatory known as LISA. Scheduled for launch in 2034, it consists of three spacecraft forming a triangle millions of kilometers wide.

It is interesting to note that on 30 March 2022 it was reported that the Hubble Space telescope had observed a star, nicknamed Earendel, which is the earliest and most distant star know. Earendel has a small probability of being a Population III star.

March 5th 2022 RASC Halifax Centre Meeting:

(31 attendees)
To watch a replay of the meeting, please visit:
https://www.youtube.com/watch?v=FRnnQrlqMfs&t=7095s on the RASC Halifax YouTube Channel.

President's Remarks
Welcome - Judy Black 0:00

RASC Halifax President Judy Black welcomed everyone to the monthly meeting, explained the benefits of membership and reviewed the agenda. She acknowledged the Indigenous lands in which the meeting was held and read the Centre's inclusivity and diversity statement.

Photo Montage Presented by Paul Gray 5:08

Paul Gray presented members' astrophotos. Despite February's overcast weather, he highlighted a wonderful collection of images of the sun, the moon, and more by (in order of appearance) Jerry Black, Michael Boschat, David Hoskin and Paul Gray. Members can send their images (including sketches) to the email chat list or directly to his email for inclusion in a future montage.

Special Presentations

- **David Shuman (Montreal Centre)** 8:57

  The New Space Race: A look at current Launch Vehicles and Human Spaceflight (Part 1)
  David presented the latest news about the space race: From Elon Musk's Starship Program to new Space Station Private ventures to the race to set up a Base on the Moon & Mars. He also spoke to the NASA and ESA's Artemis program to the Chinese ambitions in space.

- **David Chapman (RASC, Halifax Centre)** 1:27:22

  What's in a Name? How celestial objects are named
  The first in a series of talks about how celestial objects get their name, this episode focuses on minor planets (asteroids) and how they are named. Dave also tells the story of one particular minor planet, discovered 28 August 1986 at La Silla Observatory in Chile by Henri Debehogne, and how it came to be (10047) Davidchapman.

  Dave walked through how provisional names are issued and how the permanent serial number is issued and finally the "Proper" Name.

Paul Heath - Food for the Soul 1:58:15

Paul presented his latest poem, *Give Me a Tall Ship* which can be read on page 31 of this edition of *Nova Notes.*

What's Up in the March Skies? with David Hoskin 2:01:42

David reviewed recent solar activity, the opportunities to see Zodiacal Light, the Moon, as well as targets needed to check off for Explore the Universe, and when they can be viewed.

Planets in March - Mercury starts out low, and is lost in the light by the end of March.
Close conjunction Mercury with Saturn occurred on March 2.
Venus conjunction with Mars on March 12 and Saturn on March 29
Jupiter in morning twilight at the end of March.
Saturn will be well separated from the sun by mid-month, and viewable
Uranus visible under dark skies in the evening
Neptune conjunction with the Sun, so will not be viewable this month

He reviewed the spring constellations, stars, double and multiple stars and DSOs that will also be visible, and those that can be used to satisfy Explore the Universe requirements.

March is also the month for Messier Marathons, David reviewed the logistics and opportunities.

Judy Black - News from the Board 2:18:39

Governance has now been approved as of March 1, with a policy regarding membership and conflict, should it arise.

Peter Hurley is chair of the nominating committee, but requires a committee, if you are interested, please let us know.

SCO moves to Phase 2 Guidelines March 7-20 - No more than 15 people with/without physical distancing. Masks required indoors and when physical distancing not possible.

Phase 3 begins March 21 - all restrictions on the SCO site are lifted. Encouraged to continue wearing masks, to distance when appropriate and to get vaccinated.

Halifax Centre Stars

David Hoskin's Solar Prominence photo appeared in EarthSky on February 6, and he also appeared on CTV News Atlantic, *Live at 5* on February 11.

Fiona Morris' photo of Five Islands Provincial Park appears in the March/ April *SkyNews*.

Sky-Watcher's Newly minted brand ambassador is Fiona Morris

John McPhee's photo recently appeared in the Chronicle Herald Feb 26, 2022

January/ Feb edition of NovaNotes is posted online and the next edition

2022 Observers Calendar is available for $10 and only eligible for pick up only!

Upcoming meeting and event dates were reviewed, as well as the fact that a team has been assembled to look at the possibility of a “hybrid” meeting structure to allow for members to attend from all over.

Insider’s Guide to the Galaxy continues online as well. It now includes a 3-5 minute “Messier Minutes” segment. Visit rasc.ca/messier-minutes for more info.

Coming soon! Information on the 2022 RASC General Assembly (GA) - it will be held June 24-27.

Judy reviewed how to become a member, the benefits of membership and that financial assistance is available. After thanking everyone for attending, the meeting was adjourned.

April 2nd 2022 RASC Halifax Centre Meeting:

(33 attendees)
To watch a replay of the meeting, please visit:
https://www.youtube.com/watch?v=Kiceii2Pr5M on the RASC Halifax YouTube Channel.
(click on noted time to launch specific segments)

President’s Remarks
Welcome - Judy Black

RASC Halifax President Judy Black welcomed everyone to the monthly meeting, explained the benefits of membership and reviewed the agenda. She acknowledged the Indigenous lands in which the meeting was held and read the Centre’s inclusivity and diversity statement.

Special Presentations

- **David Shuman (Montreal Centre)** 04:03

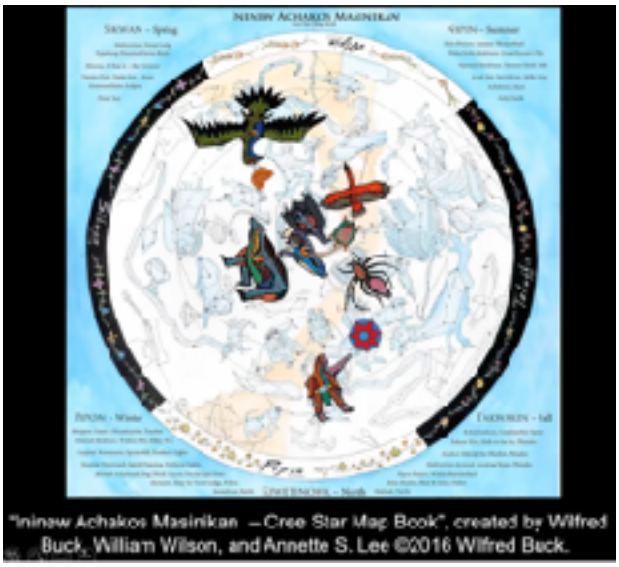
  The New Space Race & Rockets - China, India, ESA, Japan

  In this second part, David presented the latest news about the space race from China, India, ESA ,Japan, UK and Germany. He also discussed the history and impact of current events on the Russian space program.

- **Sky Lore - Chris Young** 1:23:22

"Meanderings in Cultural Astronomy"

Chris presented 2 stories:
The first comes from Cree lore from Western Canada regarding The Dog Stars (Little Dipper)
The second, comes from a recent book *Star Stories* by Professor Anthony Aveni and involves the Avocado and the Tapir



What's Up in the April Skies - David Hoskin 1:45:26

David reviewed stats for the Sun- including the fact that we are currently at half day of sunlight!
He reviewed recent solar activity and an active sunspot complex which was responsible for a Coronal Mass Ejection (CME) which caused an aurora.

He also reviewed the dates for moon phases for the Birds Laying Eggs moon (Penatmuiku's) also, craters as targets needed to check off for Explore the Universe and when to view.
Lunar X and Lunar V will be visible on April 8, during daylight between 4-5PM

Planets in April - at some point in the month, all planets will be visible in the sky
Mercury appears in the evening sky by mid-April
Venus is still a bright dawn object at mag -4.4
Mars mag 1 in pre-dawn sky; April 4-6 close conjunction with Saturn
Jupiter returns to the morning sky; and a close conjunction with Neptune on April 12
Saturn will be visible in the dawn sky
Uranus in the evening sky and close to waxing crescent Moon on April 3
Neptune in the morning sky by mid-April (low in East)

He reviewed the spring constellations, stars, double and multiple stars and DSOs that will also be visible, and those that can be used to satisfy Explore the Universe requirements.
Double stars that he highlighted were Mizar and Alcor.

Food For the Soul - Paul Heath 2:07:16

Paul presented his latest poem, *Story Teller* which can be read on page 31 of this edition of *Nova Notes.*

News from the Board - Judy Black 2:12:06

Governance has now been approved as of March 29 and posted and includes FAQs regarding RASC liability insurance..

Peter Hurley is chair of the nominating committee, but requires a committee, if you are interested, please let us know.

SCO moves to phase 3 March 21 - all restrictions on the SCO site are lifted.
All are encouraged to continue wearing masks, to distance when appropriate and to get vaccinated.

The gate is locked on the road going up to SCO, due to a recent issue with vandalism to a home on the road. If you are confident you will be going, contact SCO Manager John Ledard at scomanager@halifax.rasc.ca to let him know to make accommodations to unlock the gate.

Halifax Centre Stars

Blair MacDonald has another edition of Imager's Corder in the *JRASC*

Dave Lane was on CTV News Atlantic, Live at 5 on March 16 discussing Seasonal Time Change.

Jason Dain's Aurora photo appeared in the Chronicle Herald on March 15

Jason Dain also received NASA APOD honours on April 2 with his Aurora photo.

Nova Notes

Jan/ Feb edition of *Nova Notes* is posted online. The next edition's deadline is April 23

Please note effective immediately, *Nova Notes* will no longer be offered as a "print' option due to cost and resources to perform print and mail functionality.

April is Global Astronomy month - Astronomers without borders has some programs planned. See their website for details.

Upcoming meeting and event dates were reviewed, as well as the fact that a team has been assembled to look at the possibility of a "hybrid" meeting structure to allow for members to attend from all over.

Coming soon! Information on the 2022 RASC General Assembly (GA) June 24-27.

Insider's Guide to the Galaxy continues online as well. It now includes a 3-5 minute "Messier Minutes" segment. Visit rasc.ca/messier-minutes for more info.

Judy reviewed how to become a member, the benefits of membership and that financial assistance is available. After thanking everyone for attending, the meeting was adjourned.

The next meeting date is May 7 - hope to see you there!