

Vol. 14 Issue 1

Winter 2013

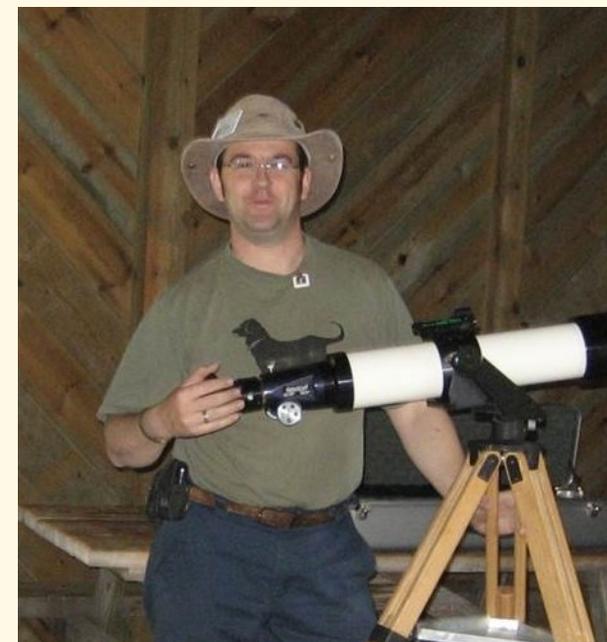
# H O R I Z O N

LA SOCIÉTÉ ROYALE D'ASTRONOMIE DU CANADA  
New Brunswick Centre du Nouveau-Brunswick  
THE ROYAL ASTRONOMICAL SOCIETY OF CANADA



## The Great Orion Nebula (M42) by Roger Pitre

This shot was taken through my 70 mm f/6 Stellarvue refractor, reduced to f/4.8. The camera was my SBIG ST2000, and this is a composite of images with exposures of 3 seconds to 5 minutes, through LRGB Astrodon filters.



## The Man behind the Image Roger Pitre

One of our best astroimagers, master collimator, wheeler-dealer, scourge of the forest, volunteer fireman, obedient husband, avid supporter of the barley/hops industry, and life of the star parties.

*Photo courtesy of Emma MacPhee*

**EVENT HORIZON**  
**Astronomy in New Brunswick**

SRAC/RASC Centre du NB Centre  
Réunion / Meetings

When: **March 9, 2013** 13:00

Where: UNB Fredericton  
Forestry-Earth Science Building  
2 Bailey Drive, Room 203

When: **April 13, 2013** 13:00

Where: Université de Moncton  
Engineering Building  
Room G148

When: **June 1, 2013** 13:00

Where: Kouchibouguac Park  
Outdoor Theatre  
Of course it will be sunny!

When: **June 15, 2013** 13:00

Where: UNB Fredericton  
Forestry-Earth Science Building  
2 Bailey Drive, Room 203

[www.nb.rasc.ca](http://www.nb.rasc.ca)

NB Astronomy Clubs  
Réunion / Meetings

**William Brydone-Jack Astronomy  
Club (Fredericton)**

A local group of members meet in Fredericton monthly for meetings and observing.

When: **March 12** at 19:00  
**April 9** at 19:00

Where: Fredericton, UNB Campus  
2 Bailey Drive, Room 203

[www.frederictonastronomy.ca](http://www.frederictonastronomy.ca)

**Saint John Astronomy Club**

Meetings consist of talks on constellations, the solar system and other astronomical topics, as well as Show & Tell, observing reports and maybe observing.

When: **April 6** at 19:00  
**May 4** at 19:00

The SJAC meetings are normally held on the first Saturday of the month at Rockwood Park Interpretation Centre.

[www.sjastronomy.ca](http://www.sjastronomy.ca)

**Outreach Events**

**March 16** STEM Expo  
Bliss Carman School  
Fredericton

**March 23** Earth Hour

**April 15 - 21** Astronomy Week

**April 20** International Astronomy  
Day

**Star Parties 2013**

**Kouchibouguac National Park**  
May 31 - June 1

**COW Mactaquac Provincial Park**  
July 12 - 14

**Mount Carleton Provincial Park**  
August 2 - 4

**Fundy National Park**  
August 30 - September 1

See Page 4 for details!

## President's Report - by Curt Nason

As of the end of February, our Centre membership stands at 65. A few have dropped out over the winter for various reasons, and we have one new member. Welcome to Douglas Margison in Fredericton! Since the last newsletter, June MacDonald has completed ten years as a member, and Thomas Buckingham, Ted Gull and Mike Powell have completed five years. Also renewing since the last newsletter are Fran Alborg, Marc Arsenault, Holly Ayles, James Ayles, Dave Beaudin, Adrien Bordage, Richard Bourque, Bob Bowser, Bruce Boyd, Angela Davis, Diane DeGrâce, Ted Dunphy, Yvon Hachey, Bob Hawkes, Malcolm Jardine, Don MacPhail, Mike Mersereau, Curt Nason, Joe Peters, Eldon Rogers, David Ross, Detlef Rudolph, François Theriault, and Chris Weadick.

We continue to distinguish ourselves nationally in public outreach. Centre outreach events since the last issue of *Horizon* in October 2012 have been (date, number of public participants, event):

- up to October 6, observing for 57 people over nine sessions at Hanwell Observatory
- October 10, four presentations to 120

- Grade 9 students at École L'Odyssee in Moncton
- October 21, observing for 15 members and parents of the Silly Frogs Junior Diabetes Group in Saint John
- October 21, observing for 5 residents of the Sainte Anne's Retirement Home in Fredericton
- October 23, observing for 6 students at the Experimental Farm in Lincoln
- October 31, presentation to 125 students at Saint Rose Elementary School in Saint John
- November 9, public observing for 50 people at Rockwood Park in Saint John
- November 19, presentation and observing for 22 Guides and leaders in Grand Bay-Westfield
- November 20, presentation and observing for 25 Brownies and leaders in Quispamsis
- November 27, STEM exhibition with Science East for 30 in Florenceville-Bristol area
- up to December 11, education sessions on light pollution abatement for 13
- December 12, STEM exhibition and observing with Science East for 150 in St. Andrews
- January 14, 22 and 28, presentations for 20 Grade 1/2 students and teachers at Rothesay Elementary School
- January 15, presentation and observing

- for 40 Cubs and parents in Rothesay
- January 17, observing for 25 students and parents of Rothesay Elementary
- January 24, presentation to 50 Grade 9 students and teachers at École Sainte-Anne in Fredericton
- January 26, public observing for 40 moonlight hikers at Irving Nature Park
- February 12, presentation for 30 Beavers, Cubs and parents in Saint John
- February 13, presentation for 40 Grade 6 students and teachers at Millidgeville North Middle School in Saint John
- February 26, observing for 30 Pathfinders, Guides and leaders at Rockwood Park in Saint John

Earth Hour is March 23 at 20:30, and Astronomy Week runs April 15 - 21. Think about what you can do on these occasions to introduce someone to the pleasures of astronomy.

Our biennial election for Centre Council was held during the Annual Meeting in Moncton last October, and the results are shown on the last page. I welcome Angela Davis to her first term as Councillor, and the return of Don Kelly to that position after a hiatus from Council. Thanks to the others who have offered to continue to serve the Centre, and to Mandy Bregg for her work as Treasurer in 2011-2012.

**Notes from the Star Party  
and Events Committee  
- by June MacDonald**

Plans are under way for the 2013 “Star Party Season.” It’s a chance to not only get some observing in, but to socialize and get to know other members, check out others’ astronomy equipment, talk about all things astronomical and introduce the public to the wonderful world of the cosmos. A reminder will be sent out a month prior to each weekend. The dates are:

Kouchibouguac: May 31 - June 1  
COW (Mactaquac): July 12 - 14  
Mount Carleton: August 2 - 4  
Fundy: August 30 - September 1

The weekends consist of solar and dark sky observing for the public and (after public observing) members. There will be a Star BQ group supper at Mactaquac and Fundy. You are on your own for meals at Kouchibouguac and Mount Carleton. Also at Mactaquac, there will be a Swap Table set up if anyone would like to bring along astronomy equipment to sell or swap. If it turns out to be a popular activity it will continue next year and may become part the other star parties.

There will be free camping only at Fundy

and Mactaquac (as before). There is one free site for two nights at Kouchibouguac for the organizer, and one free night for two other people who volunteer to help during the weekend. You will need to contact the Parks directly to book your campsite. Please tell them you are with RASC NB so they will place us all in the same area. Emma will get approval from the Department of Transport to use laser pointers at each of the parks.

We are looking to improve the signage so the camping/observing site can be found more easily. We are also talking about using some identification so club members can be easily identified by the public. We will have Moon Gazers’ Guides and Star Finders, as well as a few other handouts for the public. There are plans to make a short list of familiar night sky objects to ensure the public gets to see these common sights, in addition to the more exotic deep sky objects.

Adrien will be organizing public solar observing, so if anyone with the proper equipment can assist please notify him. Adrien will also be doing a Telescope Clinic on Saturday afternoon at some of the star parties. There will be no talks this year, as the talks last year were not as successful as had been hoped. This may

change over the years. Perhaps the parks may request that some kind of public presentation be made, so we will play it by ear. During the evening public observing someone will do a simple What’s Up for the public, using a laser pointer to identify prominent objects and how to find things in the sky. This will hopefully make it easier for people to follow what they see at the eyepiece and to remember when they are on their own.

We will try to do a better job of counting how many of the public attend each weekend. This helps the parks and the committee to make plans, and provides proof of the public interest.

Well, these are the plans so far. If you have any questions or suggestions, please notify me at [junie@nbnet.nb.ca](mailto:junie@nbnet.nb.ca). We hope many of our members will be able to attend our RASC NB family gatherings this year and that they will be as successful as last year.

Your Star Party & Events Committee

June MacDonald  
Emma MacPhee  
Adrien Bordage  
Curt Nason (*ex officio*)

**Focus on...**  
*Diane DeGrâce*

**When and how did you become interested in astronomy?**

In general, my childhood memory is poor but this I remember clear as day. I was in Grade 5, so about 10 years old, and I was leaning on the oil tank in the back of our house looking up at the Moon. What I was doing there in the first place, I have no idea. As I was staring at the Moon, it dawned on me that the Moon was a sphere; not a flat disk, but an actual sphere sticking out toward me. It really changed my thinking. My entire outlook of the sky and its spatial arrangement changed in that one instant. Space wasn't just pretty pictures in books anymore, it was real 3-dimensional space and it was really out there. I may not have had the vocabulary at the time, but I am convinced something clicked in my brain and my spatial cognitive awareness was awakened. I've been wonderstruck by astronomy ever since.

**What have been your top 3 observations?**

First: In my late teens, I was setting up my brand new, top of the line, 8" Meade in the backyard in Tremblay Settlement. I was aiming at a bright star. I "caught" it and I

focused on it and it turned out to be Saturn!!! With the rings and a few moons!!! My Dad heard me shriek and thought I had dropped the telescope. Needless to say, you can't beat that sight, especially because it wasn't expected.

Second: Seeing solar flares and prominences for the first time on Eloi Lantheigne's 12" Meade. That was remarkable.

Third: Seeing the Veil Nebula at Mt Carleton park. I believe it was through Ted's telescope.



*Diane does a What's Up*

**What enticed you to join the RASC?**

Astronomy has always been a solitary hobby for me and joining RASC is a way to share time with people that understand your passion for stuff you'll never be able to touch, feel, smell or taste. A purely vis-

ual hobby; you gotta love it to stick with it.

**Tell us about your outreach efforts and your hopes for further outreach.**

I am the contact person for the new astronomy program here at my work, the CCNB (Bathurst Community College). I go to local public schools and our nature park and give presentations. It's always fun to talk to the public about astronomy; it brings out the curiosity in all of us. As a teacher, I often say: "Learning starts with curiosity. Without it we learn poorly; with it, we evolve."

**If you were given \$1000 for astronomy equipment, what would you buy?**

I would give it to an inventor toward the design of a feet heating device for winter observing.

**What could we do to make our meetings more interesting and useful?**

I think you guys are doing a terrific job as is. I wouldn't change a thing. I admire and APPRECIATE your devotion to the hobby. It allows me, as a member, to benefit by sharing and socializing with others "of my kind," and hopefully, I can return the favor in the future by being more involved as an organizer.

## Observing the Venus Transit from Hawaii

(Part 2 of 2) by Detlef Rudolph

### Analysis of the photographic data and calculation of the Earth's distance from the Sun

(Part 1 was in the Sept-Oct 2012 Horizon.)

After my fruitful trip to Hawaii to observe and photograph the 2012 transit of Venus, it was time to make sense of the data. The intention was to duplicate Captain James Cook's 1769 expedition to Tahiti, timing the transit from two different locations, and using Edmund Halley's method of determining the distance of the Earth from the Sun (the astronomical unit, AU).

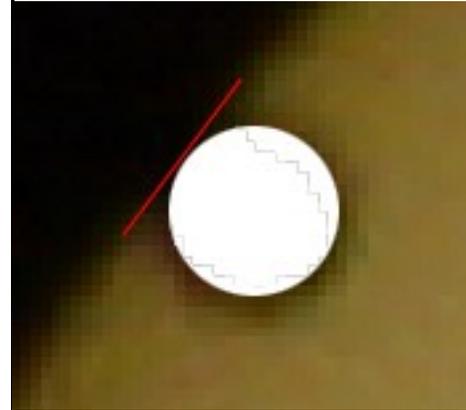
The geometry of Halley's method involves some very challenging math, so we chose a simplified method that only required some basic trigonometry. This required only the exact contact times for Contacts II and III. First contact is almost impossible because Venus touches the Sun's photosphere out of blackness, unless a filter is used that is able to show Venus progressing through the chromosphere. In any case, we didn't need to use first or fourth contact.

The basic method is to 1) determine the exact contact times; 2) calculate the duration; 3) do the same for another location; 4) calculate the parallax angle (the tiny angle between the position of Venus as seen from the two locations); 5) calculate the distance of Venus from the Earth; 6) and then, using the relative distance of Venus from the Sun in AU (from Kepler's third law), calculate the AU -- the Earth-Sun distance. This is all very straightforward.

My photos of the Sun turned out quite well. The stiff breeze on Mauna Kea made about 8 out of 10 shots blurred and unusable, but having taken groups of three or more meant that at any particular time there were several good ones from which to choose. The camera had recorded the time to the nearest second, and the reference clock gave us the offset correction, enabling us to get the exact UTC time for every frame.

First came the task of identifying the photos that corresponded to Contacts II and III, so the student, Justine, studied the images close up. Oops! Here comes Murphy's Law! It turned out that two optical effects happened which made this difficult: the so-called black drop effect, where the silhouette of Venus appears to cling to

the edge of the Sun and then suddenly let go (Captain Cook's notes mention this difficulty and the resulting large variances among the various Tahiti observers); and also the slight blurring and pixellation of the edges of the Sun and Venus when the photos were greatly enlarged on the computer screen, due to the resolution of the camera. We just looked at each other, because we really couldn't decide which picture was the correct one. We thought we had one, and then another one turned out to look just as good. I needed to invent a way around this, and fortunately Photoshop came to the rescue.



Enlarging the images in Photoshop allowed me to draw a line that was tangent to the edge of the Sun at

the point of contact, and also draw a white circle overlaying the silhouette of Venus. The photo that had the white circle just touching the tangent line would be the photo at the exact moment of contact. With a bit—well okay, a lot—of practice on several frames, this turned out to be

quite satisfactory. I started with third contact, which seemed to be the simpler one, examined several frames around the expected contact time, and found the perfect one. This gave us a time of 04:26:42 UTC for Contact III. So far so good. This looked promising.

Then on to Contact II. Oops! Murphy again. Much to my surprise, there was not one single shot that was taken at the correct time. Was I dozing? Now what? I panicked slightly, thinking that the whole trip would be for nothing!

Then it occurred to me that since Venus was moving at a constant speed I could look at a “before contact” and “after contact” photo (with their exact times) and get the distance of each one from the edge of the Sun. Then I could use the ratio of distance to time to estimate the correct second contact time. I got the two photos on the screen, took out my ruler, and measured the pictures. I interpolated from both directions as a double check, and got the same time. Good! This gave me a time of 22:27:54 UTC for Contact II. I did determine that this had an uncertainty of  $\pm 8$  seconds. The duration of transit was 21,528 seconds.

A second location is needed that had the entire transit visible. Two candidates were Sydney, Australia, and Anchorage, Alaska. We settled on Anchorage since the longitude is similar to Hawaii, making a longitude correction unnecessary. An on-line search turned up no original contact time observations at Anchorage, so we decided to use the published times in the Observer’s Handbook (2012 p. 151). It is really the time difference between Contacts II and III that is important. For Anchorage the duration was 22,002 seconds, 474 seconds longer than Hawaii.



*Detlef gives his neck a break from looking straight up at the Sun*

Wow. That tricky part was over. Now, on to the math!

I won’t bore you with the details of the geometry and the calculation of the parallax angle for Venus. If you really want to know, I’d be happy to send you my PowerPoint presentation that shows the angles and the trigonometry required. I will just say that the Observer’s Handbook (2012 p. 147) came in very handy (in fact essential) for determining the angular position of Contacts II and III from the centre of the Sun, as well as the details for Anchorage, and that several Web sites gave me the techniques to wade through the method.

It turns out that the Anchorage-Hawaii parallax angle is only  $1/180$  of a degree, a very tiny value! Does this have any hope of giving a result? Well, yes, it does. Using this tiny angle along with the Anchorage-Hawaii distance of 4308 km (perpendicular to the ecliptic) gives us a Venus-Earth distance of 42.08 million km.

The mean distance of Venus is 0.277 AU from the mean distance of Earth. However, on June 5 both planets were near aphelion, and the Observer’s Handbook (2012 p. 102) states they were 0.289 AU apart on that date.

So, dividing the Venus-Earth distance by 0.289 I obtained a value for the astronomical unit of  $146 \pm 3$  million km. This compares very favourably with the true value of 149.60 million km.

Thus with a simple digital camera, a Galileoscope, a good location and good weather, it was possible to do something interesting, educational, and even astonishing. I hope this may inspire others to go beyond simple stargazing and observing, and to actually take some measurements, such as apparent brightness of variable stars, or shadow lengths of craters on the Moon. Just use your imagination.

We had hoped to extend this project by measuring the dimming of the Sun as Venus passed in front of it, which is one way of finding extrasolar planets. The Hawaii photos and a very sensitive light meter might make that possible, but that will be for another day. Is anyone interested?

References:

- <http://www-istp.gsfc.nasa.gov/stargaze/Svenus3.htm>
- <http://www.exploratorium.edu/venus/question4.html>
- <http://brightstartutors.com/blog/2012/the-transit-of-venus>

## Teaching Grade 9 about Light Pollution - by Holly Ayles

On January 24 I had the opportunity to speak to two ninth grade science classes at about light pollution. It was a great opportunity for both me and the students. I really enjoyed speaking to them and I'd like to think they enjoyed having me there.

I began by briefly introducing the concept of light pollution and then proceeded to explain its effects on animals, humans, astronomy, and the environment. The teacher had them trying to guess what the effects were and I was quite impressed with how many correct answers I got.

I then explained that, as an amateur astronomer, light pollution was a subject that affected me, so I chose it as a topic for my eighth grade science fair project. I showed them my poster and explained what I had done for my project. It was at this point that I pulled out the Sky Quality Meter (SQM) and let the kids experiment with it a little bit. I had them compare the readings when the classroom lights were on, when the classroom lights were off, when their hands were over the top of the SQM, when they were closer to the classroom

light, whatever they could think of. I found it gave them a better understanding of my project and what the readings meant when they could see and test it for themselves.

I talked about going around New Maryland to get the readings and showed a few students who happened to live in New Maryland what the readings were near their houses. I told them about where the project has taken me and all the crazy things that have happened to me since I won the poster contest.

I spoke a little more in depth about what I consider to be the highlight of this experience: winning the Ken Chilton Prize and meeting Jocelyn Bell Burnell. I finished up by telling them about the RASC and the WBJAC, should any of them be interested in astronomy, and encouraged them to come out sometime.

Afterwards, the teacher asked me if I'd like to come back next semester to give the same presentation. All in all, I have to say it was a success!

## OBSERVERS' SCORECARD

	Explore the Universe	Messier	Finest NGC	I. William-son Lunar	Deep Sky Challenge	Dark Nebulae	Herschel 400	Levy Deep Sky Gems	Caldwell	Arp Galaxies	Abell Galaxy Clusters	Hickson
James Ayles	37											
Adrien Bordage	100											
Charles Doucet	110	110	110				65					
Ted Dunphy	102	110	110	51	10	8	265					
Colette Fortier	87	28										
Peter Jensen	12	73										
Don Kelly	110	110										
Danny LeBlanc		110	110				127		8	21	21	9
Emma MacPhee	78	110	110	5								
Curt Nason		110	110									
Mike Powell	70											
Detlef Rudolph	62											
Chris Weadick	71	26										

This section is intended to inspire our members to get out observing by promoting a friendly competition. To be included please contact Peter Jensen.

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