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The Reflector

Newsletter of the Peterborough Astronomical Association

Partial Solar Eclipse Wows the Crowd

Partial Solar Eclipse. The partial solar eclipse with sunspot AR2192 prominent was photographed and viewed by members of the Peterborough Astronomical Association on October 23, 2014. Photo by Phillip Chee.

Solar eclipses are commonly rare as they say. North America was the stage for a partial solar eclipse on October 23. Members of the Peterborough Astronomical Association held court on "The Hill". Read more coverage of this event inside this month's newsletter.

President's Message

The Year End is Fast Approaching

It seems we just got started on what's been a good year for the PAA and we now contemplate the year end. Next month will be our annual general meeting and Christmas social. Don't forget to bring a few cookies or snacks of your choice to the meeting. It's always a pleasant evening and a great way to end the PAA year.

Sean has agreed to be the election chair again this year. There are a few positions to be filled so please consider "stepping up to the plate" to help with the running of this great organization. Sean will get a message out indicating what positions need to be filled and request volunteers or nominations from the membership.

On a sad note a dear friend and long time member of the PAA, Trish McCloskey, has been diagnosed with ALS. Please see the message by Phil Chee as we offer our support to Trish.

Rodger Forsyth
PAA President

Letter from the Editor

Trish McCloskey

I want to let our little club know about a former club executive, Trish McCloskey. Trish served as treasurer and membership director for a number of terms and has been a fixture at public outreach events with her face painting table. She has been an enthusiastic supporter of our organization.

Sadly, Trish has been diagnosed with ALS, commonly known as "Lou Gehrig's Disease." Rodger Forsyth and his wife Louise have been providing Trish support in the form of transportation for medical visits and some finanical support.

In order to broaden support I have proposed to the executive that we, through this newsletter, let you the membership know about Trish's health. With Trish's permission we humbly ask, if you are interested in providing financial or other support to contact Rodger Forsyth. There are plans to setup a trust fund to receive donations, which will be used to engage a Community Care Access Centre and to provide other day-to-day supports.

We all wish Trish wellness and health.

Phillip Chee
Editor, The Reflector

The Reflector

The Reflector is a publication of the Peterborough Astronomical Association (P.A.A.) Founded in 1970, the P.A.A. is your local group for astronomy in Peterborough and the Kawarthas.
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A Sunset to Remember

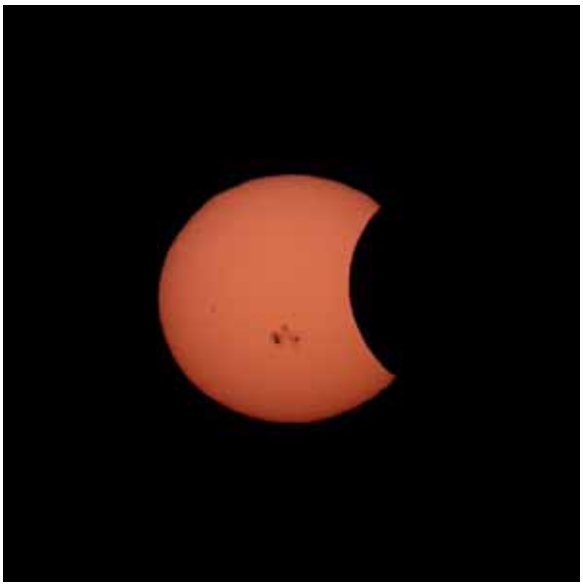
Rick Stankiewicz

There was a nice little gathering of people (maybe 50) on Armour Hill before sunset on the evening of Thursday, October 23rd, 2014. What was all the excitement? They all heard about the partial solar eclipse that was to happen then, provided the skies were clear. Given the luck we have had recently around Peterborough for astronomical viewing of any kind I don't think anyone expected too much, as we just couldn't get a break with the weather. Were we ever in for a treat though.

Eclipse day was cool and clear and beyond everyone's wildest dreams the sky remained almost cloudless to the west right through until after sunset. It was a miracle by all accounts. Of the PAA members that attended a little "Solar Party on the Hill" there were at least five telescopes and three camera set-ups going steady with a rotation of viewers of both PAA members and public who showed up for the show.

The attached pictures were all taken within 40 minutes before sunset. The maxi-

See "Eclipse" on page 15



Eclipse Night Cloudbow

Rick Stankiewicz

On the evening of the last partial solar eclipse (October 23rd) those of us on Armour Hill were treated to a relatively rare atmospheric phenomenon called a cloudbow. That's right, a partial rainbow in the clouds, not in the open as you normally see a rainbow or part thereof. Just like rainbows are caused by light from the Sun both refracting and reflecting through uniform sized particles of precipitation (raindrops) in the air, a cloudbow can form where a rainbow would, but it is the uniform moisture in a cloud that does the diffracting in a broader band of colour. This phenomenon can only occur opposite the Sun, but not at the anti-solar point (directly opposite), but about 42 degrees to either side of this point, as in the case of a rainbow. Of course conditions have to be just right and above all, you have to take note of it. This is exactly what happened during our recent solar eclipse excursion on the Hill. While everyone was focused on the setting Sun in the clear western sky, a few of us noticed the clouds in the east and the odd looking comma-shaped cloud that had a broad band of diffuse spectral colours to it. I had never seen this particular phenomenon, but realized it was unusual.

I conferred Les Cowley @ www.atoptics.co.uk who is beyond a doubt, a worldwide expert on atmospheric optics. It was his opinion that it was likely a cloudbow or at least a part of one. On the night of October 23rd we were literally surrounded with photographic opportunities and wonders. All the more reason to … keep looking up.

Ron Brecher
The 2,500 Year History of Astro-imaging

Guest speaker Ron Brecher poses for the camera with *The Reflector* editor, Phillip Chee. Photo by John Crossen.

John Crossen

Is there a link betwwen the Pyramids and modern day astro-imaging? Ron Brecher believes so and he took us on a journey over the past few hundred thousand years to the earliest cave paintings to prove it.

It was exciting to see how some of the cave paintings were actually star charts showing Taurus the Bull and the Pleiades in perfect relationship to each other and how the Pyramids are lined up to represent Orion's belt. Obviously people have been looking up and recording what they see for a long time. Credit this to mankind's fascination with the mystery of the night sky.

Ron's well illustrated talk not only covered the archeoastronomy aspects of astro imaging, but the technological developments from Daguerreotypes through glass plates to film and modern digital imaging. His side-by-side comparison of professional images and those which can be achieved by amateurs was most impressive. It takes very close inspection to see the difference between today's amateur work and that of

See "Ron Brecher" on page 16

Hey, Wanna See the Moon's Belly Button?

Crater Tycho. The crater Tycho was named in honour of the Danish astronomer Tycho Brahe. He is famed for inventing and building precise instruments to measure stellar coordinates and map the skies. Much of modern astronomy had its roots in Brahe's data. He lived from 1561 to 1601 and is also credited with making observations of an immense supernova as well as establishing that comets were beyond Earth's atmosphere. He lost part of his nose in a duel with one of his students over who was the better mathematician. The nose replacement was made of gold. Ahhhhchoooo!

John Crossen

The weather may be getting nippy, but overhead are some hot sights that'll put heaters in your Adidas.

On November 6 Moon-a-tics can check out dear old Luna's belly button. Actually it's a large crater properly known as Tycho (Teeko). You can see it with the naked eye, but with a pair of binoculars it jumps out quite clearly. Tycho is 86 km in diameter and the debris trails from the impact that created it stretch 1,500 km out from the impact site. That's nearly as far as the distance from Toronto to Kenora, so it must have been quite a smack.

See "Tycho" on page 12


I WANT YOU
TO RUN FOR
PAA EXECUTIVE
www.says-it.com/unclesam/

PHOTO GALLERY

Lunar Eclipse

Here is My Total Lunar Eclipse Grand Finale photo!! The lunar eclipse phases as seen from Dayton, Ohio on October 8, 2014.

Despite the heavy dew and fog... all turned out well!!

The Bright star near the Moon at the 5 o'clock position is 5.74 mag SAO 109471 which was just occulted by the Moon 30 minutes earlier.

Atop Huffman Dam, Dayton, Ohio, photographed with a Canon 6D, 80mm refractor, 2x Barlow (1200mm) ISO 800 to ISO 6400, 1/400 sec to 2 sec exposures.

Best Regards,

John Chumack www.galacticimages.com

The Running Man

The three objects NGC-1973, NGC-1975, NGC-1977 make up the Reflection Nebula Complex, nicknamed the Running Man Nebula. It is located ~ 1460 light-years away in the constellation of Orion.

The cloud is complex as there is a red emission region directly behind the dominant blue reflection nebula, which is reflecting light from these young hot blue stars. The region is abundant with gas and dust clouds — NGC1973-75-77 is located 30 arc-minutes north of M42/M43 The Great Orion Nebula.

I captured this image on October 26, 2014 from my observatories at JBSPO in Yellow Springs, Ohio using a Canon 6D DSLR and Homebuilt 16" f/4.5 Newtonian scope at ISO 3200 for a 32 minute exposure (8 × 240 second subs).

John Chumack www.galacticimages.com

Where does the sun's energy come from?

National Aeronautics and Space Administration

NASA

Every 1.5 millionths of a second, the sun releases more energy than all humans consume in an entire year. Its heat influences the environments of all the planets, dwarf planets, moons, asteroids, and comets in our solar system.

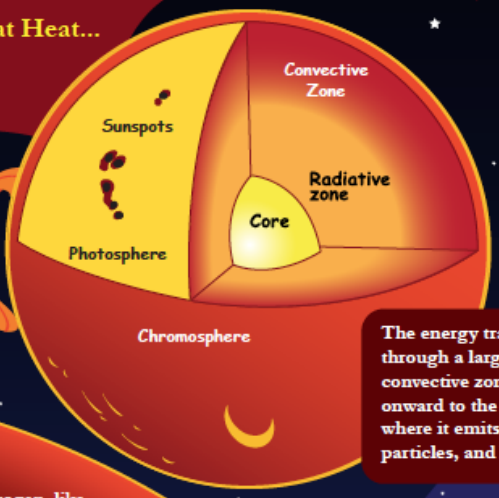
And that light travels far out into the cosmos—just one star among billions and billions.

Create a 'solar wind' that pushes against the fabric of interstellar space billions of miles away.

Allows gases and liquids to exist on many planets and moons, and causes icy comets to form fiery halos.

Powers the chemical reactions that make life possible on Earth.

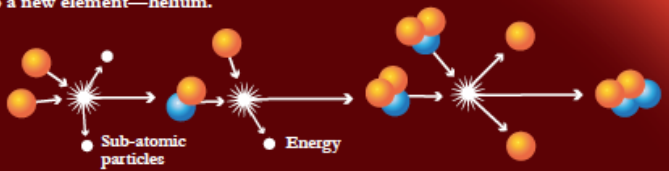
That Heat...



The energy travels outward through a large area called the convective zone. Then it travels onward to the photosphere, where it emits heat, charged particles, and light.

How does a big ball of hydrogen create all that heat? The short answer is that it is big. If it were smaller, it would be just be a sphere of hydrogen, like Jupiter. But the sun is much bigger than Jupiter. It would take 433,333 Jupiters to fill it up!

That's a lot of hydrogen. That means it's held together by a whole lot of gravity. And THAT means there is a whole lot of pressure inside of it. There is so much pressure that the hydrogen atoms collide with enough force that they literally meld into a new element—helium.



Nuclear Fusion

This process—called nuclear fusion—releases energy while creating a chain reaction that allows it to occur over and over and over again. That energy builds up. It gets as hot as 15 million degrees Fahrenheit in the sun's core.

Space Place in a Snap!

www.nasa.gov

For more articles, games, and activities, visit **spaceplace.nasa.gov**

BOOK REVIEW

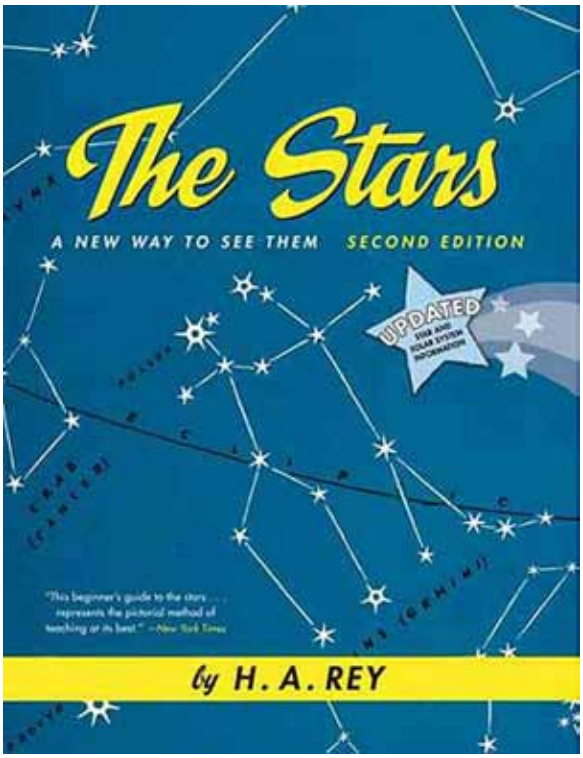
Kenneth Sunderland

Christmas is coming. Perhaps you're thinking about a first astronomy book for a young person on your list. You can do no better than H.A. Rey's now classic *The Stars* first published in 1952. Rey, who is best known as the creator of *Curious George*, clearly had more than a passing interest in astronomy. The subtitle *A New Way To See Them* gives a clue as to the book's enduring charm and significance. After all, you still find this book in most libraries, now more than a half century later.

This introduction to the celestial sphere makes pleasant reading and is filled with cartoons done in Rey's marvellously unique style. It shares many of the qualities that make a Curious George story so delightful. The narrative follows a what, where, when and why format. The information is delivered like softly falling snow and yet, by the end, there has been a considerable accumulation. Its four parts are titled; 1. Shapes in the Sky, 2. Meet the Constellations, 3. The Stars through the Year and 4. Some Whys and Hows. The book is rounded out with a glossary and a few lists, including the 21 brightest stars. The dust jacket unfolds into a poster-size sky chart.

Part 1 provides a gentle introduction to what the constellations are and Rey shares his motivation for writing the book. He proposes to draw anew the traditional constellation figures to more clearly represent their namesake. Examples are his rendering of Cetus and Taurus. His aim in making star patterns easier to visualize is to make stargazing more enjoyable ... more rational.

In Part 2 he gets down to business. His stick figure constellations are described in some detail and placed in a region of the sky, addressing both what and where. This is the heart of the project — its *raison d'être* described in Part 1. The accompanying sample page is typical of his art.



The Stars: A New Way to See Them (2nd Ed.)
H.A. Rey
Houghton Mifflin Harcourt 2008, 160 pages
ISBN 978-0-547-13279-2
$27 hardcover

Some of his constellation figures (perhaps slightly modified) have stood the test of time, such as The Twins and Cetus, while others never gained traction, such as his version of the Great Bear and Pegasus. It's interesting to compare the monthly sky charts in Astronomy, *Sky & Telescope* and *SkyNews*. Among them, it is *Sky & Telescope* that adopted or adapted many of Rey's suggested shapes, and so his book continues to influence how people regard the constellations.

see "The Stars" on page 13

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Tycho

Sticking with the Moon, November 29 is a great night to examine the line of craters that separate the Moon's lit half from its dark half. This dividing line is called the terminator. The shadows cast at this lunar phase (First Quarter) make the craters and mountains stand out. A pair of 7 × 50 binoculars will show you a lot of the impact scars on the Moon's face, but a small telescope can provide some amazing views.

If you'll turn your attention from the Moon to the stars, November has some new constellations for you to meet. Auriga the Charioteer is up and not far to the right of Auriga are the Seven Sisters, also known as the Pleiades. They are rising in the east and appear as a fuzzy patch about the size of your thumb at arm's length. Once you've spotted them, take a look through your binoculars. The sisters put on quite a show and it's rated for family viewing.

Another misty patch between Cassiopeia (Cass-e-o-pea-ah) and Perseus (Purr-see-us) is the Double Cluster. This beautiful pairing of open star clusters is one of the prime sights for winter observing. It's just visible with the naked eye but outstanding in binoculars or a low-power telescope.

Swing back to Auriga and you'll have three more open star clusters to view through your binoculars. To be honest, these are best viewed with a telescope, but they are easy to find in binoculars for first timers.

Got a hankering for some planet viewing? Then be prepared to hop out of the sack before the Sun rises. November's dawn sky is host to ruddy orange Jupiter and dazzling Venus, the brightest object in the sky after the Sun and the Moon.

Why is Venus so bright? That's because of the cloud cover that completely engulfs the planet. The clouds are very reflective, so the planet really pops when the Sun light hits it. The clouds also make Venus a bit of a disappointment because you can't see through them to take in any surface detail.

Jupiter is also shrouded in clouds. However its four brightest moons can be seen in high-power binoculars and small telescopes. They were first spotted by Galileo in 1610 and are therefore called "the Galilean Moons".

That's just a hint of what's up in November. I highly recommend the book *Night-Watch* by Terence Dickinson for those who'd like to become a little more astronomically hip. It costs about $20 on Amazon and is the only book a casual stargazer will ever need.

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The Stars

Part 3 uses monthly sky charts to address the where to look and when to look questions in the usual way. Nothing special here. Each monthly spread shows the night sky without, and with, constellation art, so that pattern recognition can be exercised. Of course, what is special are Rey's now familiar, but in their time novel, stick figures.

Part 4 is not child's play, as Rey tackles the why questions. Right ascension, declination, the ecliptic, the zodiac, sideral time, precession, Moon phases, and a brief history of the constellations does not exhaust the list of topics covered. Rey's explanations of difficult concepts from celestial mechanics are surely among the best, aided by his superb cartoon diagrams that innocently convey the message "this isn't so hard". When learning is effortless, it's like magic.

Like many reviewers before me I can only give this book a recommendation of first magnitude. Find a child on your list to give it to ... if you can part with it!

The Sky this Month

Mercury is favourably placed in the morning sky with greatest elongation west (19°) on the 1st. By the 20th it becomes lost in the Sun's glare.

Venus was in superior conjunction in late October and is not easily visible until early December in the evening sky.

Mars is moving eastward in Sagittarius low in the south-west early evening. Passes 0.8° south of globular cluster M22 on the 6th.

Jupiter rises in the ENE in late evening in western Leo.

Saturn in conjunction with the Sun and not visible this month.

N. Taurid Meteors peak at 11 AM on the 12th.

Leonid Meteors peak at 6 PM on the 22nd.

Orionid Meteors peak at 1 PM on the 21st.

Daylight Savings Time ends on the 2nd.

Moon Phases

Full Moon	5:23 PM	November 6
Last Quarter	10:15 AM	November 14
New Moon	7:32 AM	November 22
First Quarter	5:06 AM	November 29

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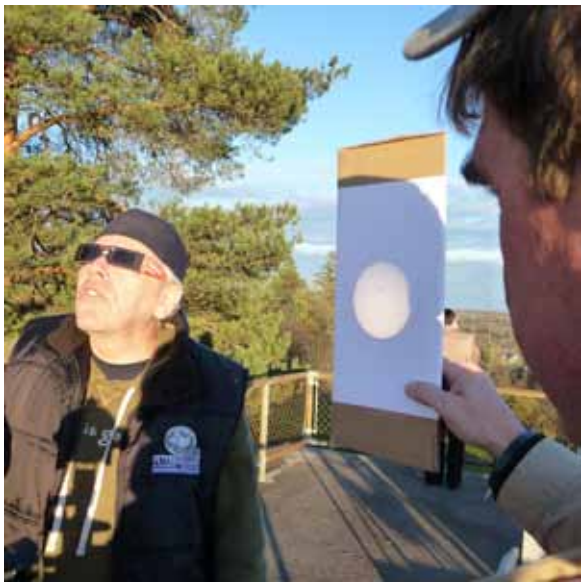
Eclipse

mum coverage of the Sun by the disk of the Moon was about 40% and then the Sun hit the western horizon and sank fast. You can note the distortion of the solar disk from round to an oblate spheroid as it got closer to the horizon. This is caused by an optical distortion of the earth's atmosphere as it bends the Sun's light coming in at such a low angle. The large dark spots on the Sun's disk are sunspots, which really added to the whole experience. The largest area near the centre was about the size of the planet Jupiter and is designated as Active Region (AR) #2192, one of the largest in recent memory. All of this came together in time for eclipse day. We finally got a break from the weather to give a sunset to remember. This turned out to be a great primer for the next big eclipse in North America in August of 2017. I can hardly wait.



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Ron Brecher

the professionals using multi-million dollar equipment from just a few years ago. We have come a long way, baby!

Ron also brought along some of his astro image work as well as the antique maps his wife has compiled and is currently in England researching. Happily both the maps and his images were available for sale, so we also enjoyed more than just memories from his visit.

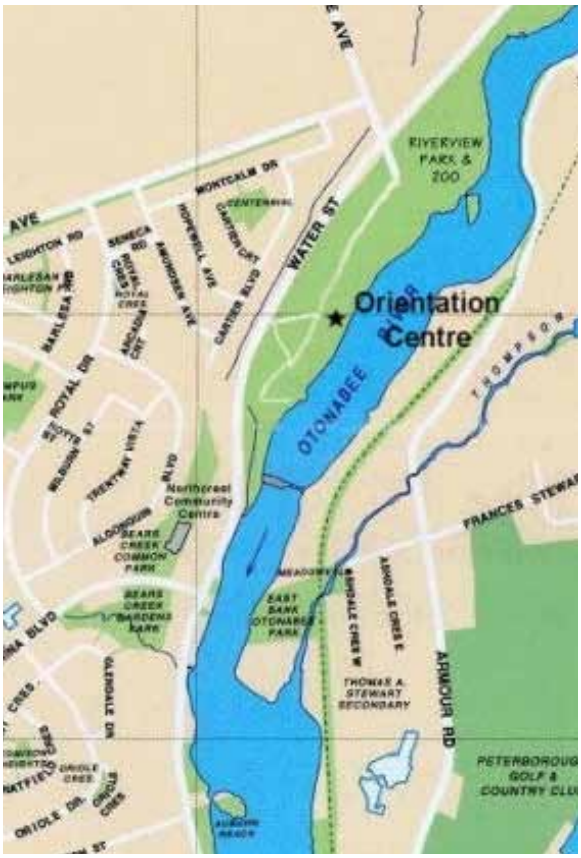
On behalf of everyone in the PAA, we thank Ron for taking time from his busy schedule to give us such a polished presentation.

Articles

Submissions for *The Reflector* must be received by the date listed below. E-mail submissions are preferred (Microsoft Word, OpenDoc, ASCII and most common graphic formats are acceptable). If your article contains photso or graphics, please provide a separate file for each. Typed or hand-written submissions are acceptable provided they are legible (and not too long.) Copyrighted materials will not be published without written permission from the copyright holder. Submissions may be edited for grammar, brevity, or clarity. Submissions will be published at the editor's sole discretion. Depending on the volume of submissions, some articles may be published at a later date. Please submit any articles, thoughts, or ideas to:

phillip.chee@gmail.com

Next submission deadline:
November 26, 2014



Meetings

The Peterborough Astronomical Association meets every first Friday of each month, except July and August, at the **Peterborough Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at 7 p.m. P.A.A. general annoucements will begin each meeting with the guest speaker starting at 7:30 p.m.