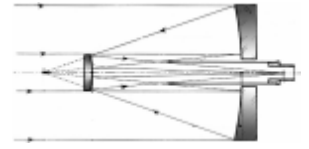


PETERBOROUGH ASTRONOMICAL ASSOCIATION

The Reflector



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Your Daily Dose of Astonishment

by Diane K. Fisher

AS A PERSON VITALLY interested in astronomy, you probably have the Astronomy Picture of the Day website at apod.nasa.gov set as favorite link. APOD has been around since practically the beginning of the web. The first APOD appeared unannounced on June 16, 1995. It got 15 hits. The next picture appeared June 20, 1995, and the site has not taken a day off since. Now daily traffic is more like one million hits.

Obviously, someone is responsible for picking, posting, and writing the detailed descriptions for these images. Is it a whole team of people? No. Surprisingly, it is only two men, the same ones who started it and have been doing it ever since.

Robert Nemiroff and Jerry Bonnell shared an office at NASA's Goddard Space Flight Center in the early-90s, when the term "World Wide Web" was unknown, but a software program called Mosaic could connect to and display specially coded content on other computers. The office mates thought "we should do something with this."

Thus was conceived the Astronomy Picture of the Day. Now, in addition to the wildly popular English version, over 25 mirror websites in other languages are maintained independently by volunteers. (See



The January 20, 2013, Astronomy Picture of the Day is one that might fall into the "quirky" category. The object was found at the bottom of the sea aboard a Greek ship that sank in 80 BCE. It is an Antikythera mechanism, a mechanical computer of an accuracy thought impossible for that era. Its wheels and gears create a portable orrery of the sky that predicts star and planet locations as well as lunar and solar eclipses. Photo courtesy of NASA.

http://apod.nasa.gov/apod/lib/about_apod.html for links). An archive of every APOD ever published is at <http://apod.nasa.gov/apod/archivepix.html>. Dr. Nemiroff also maintains a discussion website at <http://asterisk.apod.com/>.

But how does it get done? Do these guys even have day jobs?

Dr. Nemiroff has since moved to Michigan Technological University in Houghton, Michigan, where he is professor of astrophysics, both teaching and doing research. Dr. Bonnell is still with NASA, an astrophysicist with the Compton Gamma Ray Observatory Science Support

see "APOD" on page 16

Spring Has Sprung

Officially spring has arrived. When I step outside, feel the cold and look at the snow all over the yard I wonder on what planet spring has arrived. I'm a firm believer of the theory that if the groundhog sees his shadow there will be six more weeks of winter. However if he doesn't see his shadow there'll only be a month and a half. We've exceeded the allotted time so it's time to shoot the groundhog.

On March 23rd PAA members braved the cold and set up once again atop Armour Hill for Earth Hour. Stories and photos follow in this issue.

April means the annual Peterborough Regional Science Fair is upon us. The PAA will have judges again this year at Trent University. The Frank Hancock award will again be presented to the student with the

best astronomy related exhibit and a one year Family Membership will be awarded for a second place winner. John Crossen will be presenting an award from the Buckhorn Observatory.

Looking ahead we need to focus on "Astronomy on the Hill" in May. You might ask "how can I help I don't have a telescope?" We need lots of help. You can help by manning the traffic control on Saturday night. Greeting people and letting them know what we are doing. On Sunday we could use help interfacing with the public and keeping an eye on equipment when a member needs a washroom break. There are many ways you can help. Come out and get involved.

Rodger Forsyth
PAA President

Letter from the Editor

March Madness

It was a very busy month astronomically speaking the one just ended. We were greeted by Comet PanSTARRS and it didn't disappoint. Rick Stankiewicz writes about the first sighting in Peterborough. John Chumak sent us a number of his photos of the comet from down south. Spectacular.

John Crossen reports on another successful PAA observing night up in Buckhorn, one in which the astronomy gods bestowed with clear skies. He also summarizes our Earth Hour event in which aforementioned deities were not so kind.

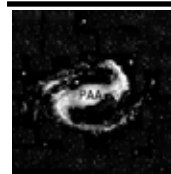
Kenneth Sunderland continues his series on the Galilean moons. Rick Stankiewicz updates us on the club's light pollution abatement activities.

When I was a teen I had the opportunity to meet Marc Garneau at Ontario Place after a special screening of his Shuttle mis-

sion movie, shot in IMAX format. Michael McCarthy got a chance to meet Garneau in Peterborough during the MP's leadership campaign. I'm sure Mike was as ecstatic as I was.

So, enjoy our latest issue. And NASA loves us, too.

Phillip Chee
Editor, The Reflector



**Peterborough
Astronomical
Association**

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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Comet PAN-STARRS Visits Peterborough!



COMET PAN-STARRS. Modified Canon 50D and 200mm lens, tripod mounted; ISO 640; 4 sec. exp.; f/4.5. Photo by Rick Stankiewicz.

RICK STANKIEWICZ

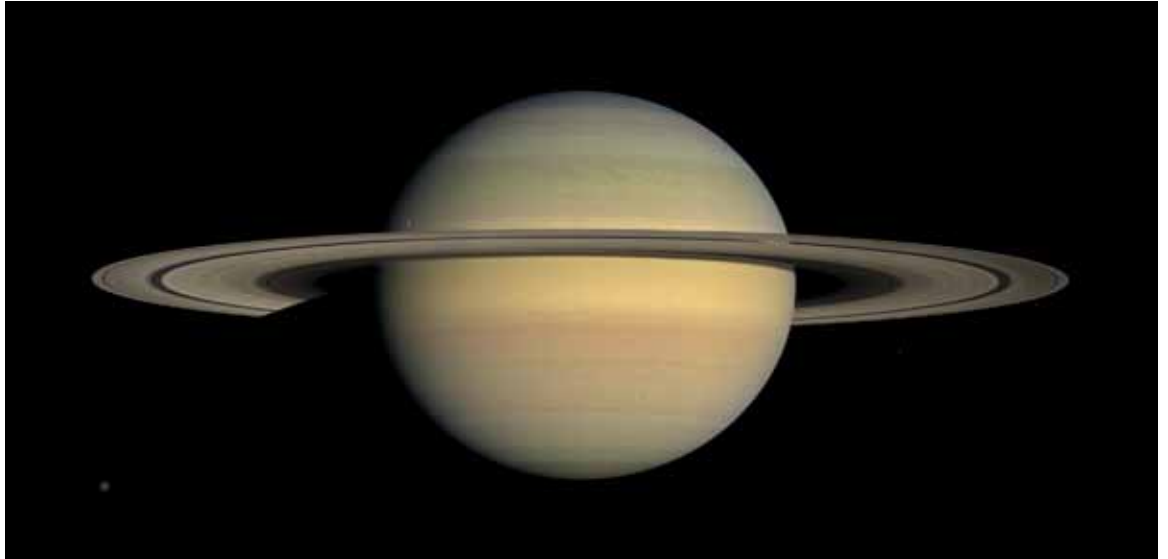
THE EVENINGS OF MARCH 14th & 16th in the Peterborough area were graced with decent views of the northern hemisphere's latest comet. If you had a clear view of the western sky about a half hour or more after sunset you might have seen this comet. Several members of the Peterborough Astronomical Association (PAA) were on Armour Hill the evening of the 14th along with a couple dozen interested members of the public. Most were armed with binoculars to witness this celestial event. We have not had clear enough skies to see the comet that should have been visible since March 12th and unfortunately the skies have not been looking good for long stretches, but don't fret, the comet should be visible into April with any luck, but every day it is getting further away from the Sun.

Comet Pan-STARRS (C/2011 L4) was discovered in June 2011, by the Panoramic-Survey Telescope And Rapid Response System, on Haleakala, in Hawaii.

The closest it got to Earth was about 170 million kilometers, or about 400 times the distance from the Earth to the Moon.

To find this comet you need to be looking west about a half hour after the sun sets and it will be more than 10 degrees above the horizon. This is roughly the height of your fist at arms length. Binoculars are handy to initially find it, but as the sky darkens you might be able to see it with your naked eye. If you miss this comet you will have to wait about 106,000 years before it comes around again. The good news is that during this "Year of the Comet", there will possibly be an even better opportunity to see Comet ISON in November of this year. Be on the look out and keep looking up!

Saturn Our Mammoth Merry-go-Round in Space



SATURN. Saturn is 800 times Earth's size and at least twice as pretty.

JOHN CROSSEN

GIANT'S THE NAME for it. Saturn dwarfs Earth 800 times over — and that's not counting the diameter of the rings, which just about double Saturn's size again. It is the second largest planet in our solar system and has the second largest moon count at thirty-three.

For the past eight years the NASA/ESA Cassini mission has been orbiting Saturn. During that time Cassini has taken thousands of stunning photographs of our solar system's glamour planet. But far more important than pretty pictures, Cassini has also made some fantastic discoveries.

For starters, the rings are actually made up of tiny particles ranging in size from pebbles to houses. Instead of being rocky, they are mostly comprised of water ice — just like in your rum and coke. The latest thinking on how they came to be is that they are the remains of ice moons that drifted too close to Saturn

a few billion years ago. When close enough to Saturn's gravitational pull the force broke them up and they remain today as the "ring" around the planet.

Saturn's ring is made up of many small rings separated by gaps. The most famous gap is the Cassini Division which is named after Giovanni Cassini who discovered a series of ring divisions in 1684. Cassini also measured Saturn's rotational speed at 9 hours 56 minutes and discovered four of its moons.

Moving back to the 21st century, the Cassini mission also discovered that Saturn's moon Enceladus has tiger-like stripes on it which spew fountains of water into space — like the Old Faithful Geyser on Earth. That means that beneath the moon's surface is a large body of water which could supply future space missions.

Saturn's moon Iapetus was discovered to be tidally locked to Saturn. That

See "Saturn" on page 15

For Once the “B” in BHO Stood for Beautiful night

JOHN CROSSEN

EVERY MONTH OF YEAR the Peterborough Astronomical Association schedules an observing session for its members. With five permanent observatories among the club's 50-some members, the observatories are usually the centres for the observing sessions.

Buckhorn Observatory was the meeting place for the March 8 gathering and it was absolutely perfect. The night was crystal clear and moon-less as the stars shown down from the inky blackness.

Rick Stankiewicz made the trek and brought along his Vixen Polaris tracker and camera to take pictures of the night sky. Joining Rick were Boyd Wood with his 10-inch intelliscope Dob and Harold Briggs with tripod-mounted binoculars. The observatory's equipment included a pair of giant binoculars which the guests all shared and the trusty little 8-inch SCT in the small Personal Observation Dome (POD).

Coffee and doughnuts were on hand as were PAA members Doug Armstrong, John Crossen, John Cameron, Janet and Norm Brown, Sean Dunne, Ken Seals, Brett Hardy, Ken Sunderland and new guests Steven and Helen. Combined with the regulars noted in the previous paragraph, this brought the roll call up to 14. No wonder the Timbits® vanished so quickly!

Targets for the night were the jewels in winter's crown. The Orion Nebula, star clusters M35, M36, M37, M38 were first to be checked off the observing list. While we were observing the treasures above, Rick Stankiewicz was imaging the winter Milky Way along with the buildings that make up BHO.

Jupiter highlighted the early evening planetary observing list and Saturn around 11:00 p.m. Ken Seals and Boyd Wood dis-

cussed the merits of Boyd's intelliscope and Ken wound up ordering one as a result of the conversation. Congratulations Ken.

Our other Ken, Ken Sunderland was especially keen on Jupiter. He has been monitoring Jupiter's moons for the last month and was able to identify them by sight. The 8-inch SCT gave him an excellent view of Jupiter's weather belts and surface detail—something that's difficult in his 80mm short tube refractor.

I thank all the PAA members who made the trek to the dark skies of BHO. The company was most welcome, as was a clear night in March.



Janet, Boyd, Doug and Norm. Photo by John Crossen.



Sean with binos. Photo by John Crossen.

Starting Out

The Galilean Moons (Part III)

KENNETH SUNDERLAND

FOUR HUNDRED AND THREE years ago ... “And I call on all astronomers to devote themselves to investigating and determining their periods.” These are Galileo’s own words from *Sidereus Nuncius*. Ok, ok ... message received by yours truly.

And so without optimism, I returned to my sketches and measured moon- \varnothing distances (in \varnothing Dia.) assigning east (-) and west (+). Time was rescaled so that the first measurement corresponded to day zero. The data was plotted. For example, Figure 1. gives the position of Callisto (IV) as a function of time, with \varnothing along zero. Each dot is an observation and the best fit to the data is a sinusoidal curve that requires a period of 16.8

days. What? That’s unbelievable. The accepted value is 16.69 days! Given my modest equipment and imprecise data, this agreement aroused suspicion. What about the others? It was no accident as Table 1. shows. How’s that Galileo?

No denying it ... these results were encouraging. Suddenly my flea market bargain became “The Little Telescope that Could.” And so, in a hobby where size matters, perhaps there is hope for the budget-minded beginner after all. How many more decimal places might an observer get with dark skies, good glass, a reticle eyepiece, and exact time?

Continued on next page

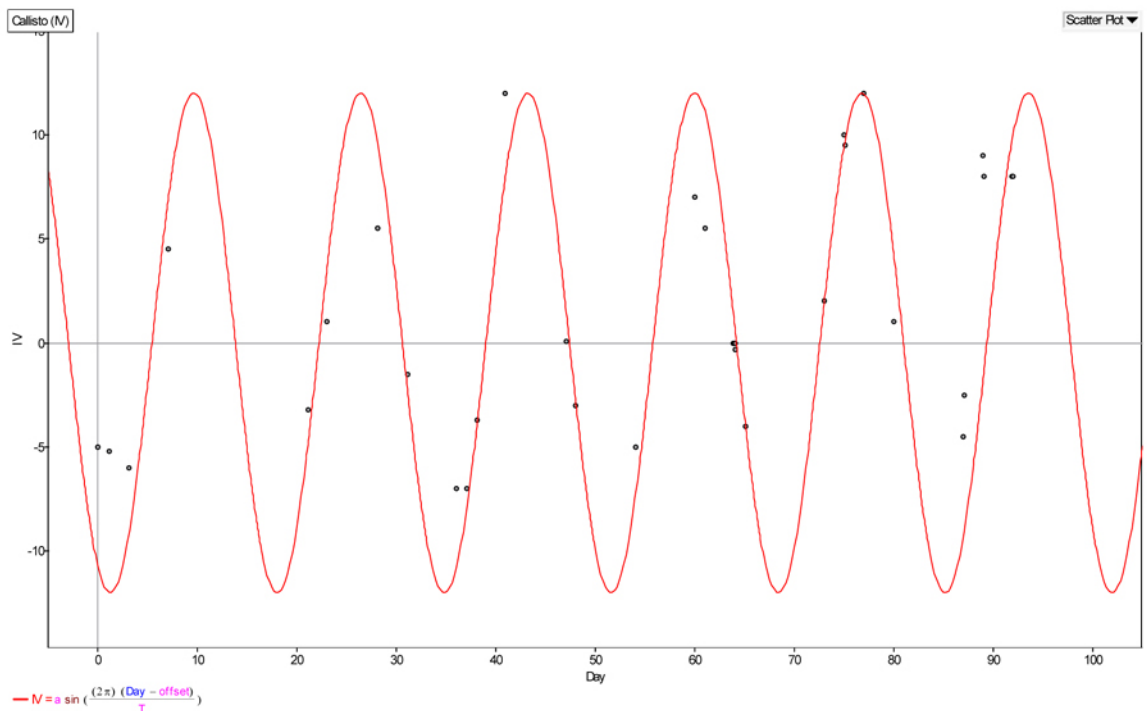


Figure 1. (IV) swinging back-and-forth about twice a month with \varnothing centred.

Continued from previous page

MOON	PERIOD (D) OBSERVER'S HANDBOOK 2013	PERIOD (D) FROM MY DATA
(I)	1.77	1.8
(II)	3.55	3.7
(III)	7.16	7.2
(IV)	16.69	16.69

TABLE 1. Table 1. Comparison of moon periods in days (d).

The sinusoidal curves for all four moons are normally plotted on the same set of axes, turned sideways, and published monthly in a magazine like *Sky and Telescope*. Figure 2 is an example. This is an efficient way to identify the moons from a single look.

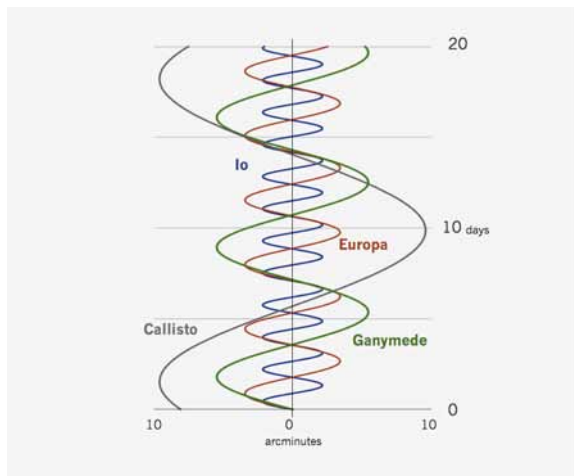


Figure 2. Source: Google Images.

Last month I lamented that the moons do not carry a unique label such as colour or size (at least not at 40×). What about brightness? Yes, there are differences. However, to my eye, no one moon is steadily brighter than another at all times — too bad! Matters are complicated by proximity to J and the seeing conditions. Nature’s variability ensures that the four moons will be different in their characteristics. Figure 3, reproduced from a previous article, does show size and brightness differences. (e.g. the

upper moon Ganymede looks bigger and brighter and, in fact, it really is.) Here is yet another identification method to add to the toolbox. Digital camera sensors allow one to directly read each moon’s unique signature. The eye is trumped.

Q: Could brightness be a function of orbital position? i.e. Does a moon look brighter in front of J when its closer?

A: I think not. A back-of-the-envelope calculation gives a change in distance of 1 part in 250 for the largest orbit.

So much for brightness.

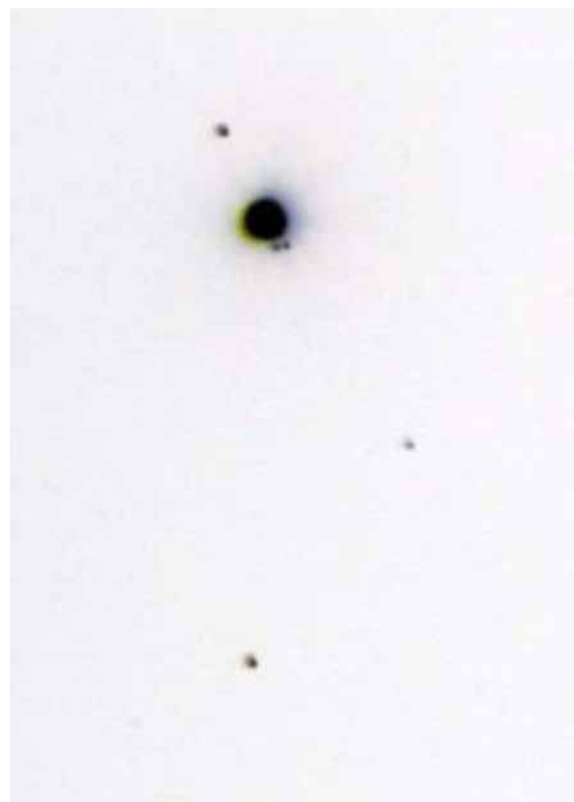


Figure 3. Photo credit :Rick Stankiewicz (22-Jan-2013).

At this point we have several lines of attack when identifying moons from a single look. (see previous article) However, there is another strategy which is dynamic. One needs steady air and lots of time. It helps to be stubborn. By recording positions at regular time intervals, over hours, one eliminates guesses, as moons move into unique positions, or more subtly, by compar-

see “Jupiter” on page 15

PHOTO GALLERY

Comet C/2011 L4 PanSTARRS



A couple of nice Comet PanSTARRS photos sent to us from John Chumak. I am really impressed by the top photo showing the airliner with the comet. Photos courtesy of www.galacticimages.com

Bet You Know Where This Is



On March 19th I was driving home down County Road #35 (Old Keene Road) about 9:00 p.m. when I noticed something a little out of the ordinary. To the west about 12 kilometers away was a large “light pillar” shooting into the night sky. I pulled over and took the following pictures with my Canon 400D on a tripod with 18 – 200mm lens. The light pillar was caused by light shining up instead of down. The stray light is light pollution reflecting off the bottom of ice crystals floating in a stacked formation in the lower atmosphere above the light source. I “bet” you know the source of the light pollution. If you said the “Kawartha Downs and Slots,” you would be right. Being the worst single source of light pollution in the region it was no surprise to see what I saw.

What was surprising was the juxtaposition of the both a natural and unnatural source of light pollution in the same frame. This night happened to be the first quarter moon above The Slots with Orion, Jupiter and Aldebaran between them. It made for a nice study of excessive lighting. It always begs the question, “What is so important that they need to light up the surrounding countryside for kilometers?”

(PHOTO DETAILS: ISO 800, f/4.0, exposure 6 seconds.)

Rick Stankiewicz



PAA's Patience was Rewarded at Earth Hour

JOHN CROSSEN

AT FIRST IT APPEARED THAT the cloud gods had done us wrong again. On the way down from Buckhorn all I could see was just a sliver of clear sky on the western horizon. When I arrived at Armour Hill the sliver had dwindled to a hair's width. As I set the scope up, that thin hair of promise vanished. Boo!

Nonetheless, most of the club members were already there with scopes at the ready. For the first half hour we had little to do but commiserate about the weather with the guests and each other.

Happily we had a few breaks in the clouds. Jupiter and the Moon played peek-a-boo while our guests got a few tempting views through the scopes. Then, at about 10 o'clock the sky opened up beautifully.

All told I'd estimate that we had about 30 guests join us. That's good for a night that started out cloudy and cold. Once the clouds were gone, spirits warmed up and the night was a success.

As far as dimming city lights during Earth Hour, we scored some new victories compared to years past—most notably the Westclock tower. Unfortunately Kawartha Downs and the merchants up Chemong Road didn't appear to get the memo.

Overall Peterborough scored about 80% of the goal achieved by other Ontario cities and towns. On the surface, that sounds like a failure. Compared to last year, however, it was an improvement of nearly 100%.

According to the utilities company enough energy was saved during Earth Hour to power about 1,000 homes. In the end it came down to proving that we waste a lot of energy on superfluous lighting. It's a waste that we pay for on our hydro bill today and that we will pay dearly for in skyrocketing energy costs in the future.

Thanks go to Rodger Forsyth and Dean Shewring who helped organize the event and direct traffic. Rodger thanks Harold Briggs who kept him company while orchestrating the flow of people up the hill.

Thanks also go to Michael McCarthy, Rick Stankiewicz, Boyd Wood, John Crossen, Phil-

lip Chee and a fellow named Chris for bringing their scopes, Astro-Trac and binoculars out to play.

As always, it was a treat to hear the "wows" of our guests who were seeing craters on the Moon along with Jupiter's weather belts and four moons for the first time. Later that evening Saturn came up and the stalwarts had a look at Saturn's magnificent rings along with the Orion Nebula and some open star clusters. Plus we all got to talk shop, which for us Nerds of the Night is a rare and treasured opportunity.

A special hug goes out to Jeanne and Pat Crebar who braved the elements despite just recovering from bad colds. As usual, Jeanne arrived with a barrage of questions which we all struggled to keep up with and answer. At 82 Jeanne has the energy of a teenager on a sugar fix.

So, whether observing the stars, or the Peterborough skyline's glow, we enjoyed some new friends and small victories. See you there again next year.

Thanks to everyone who showed up on the hill and those who participated in Earth Hour across Canada. It was a productive night.



Chris Ross with his new Meade telescope. Photo by John Crossen.



LPA Advocacy Update

RICK STANKIEWICZ

March was a busy month for the PAA Light Pollution Abatement Committee (LPAC). We had a presence at both City of Peterborough Planning Council Meeting (5th & 18th) about the issue of a new casino in the city of Peterborough. At the second meeting of the Committee a presentation was given on behalf of the PAA. Several points were put on record with a focus on light pollution (not our personal feelings about gambling): 1) there is no “good” place for a casino; 2) if there is going to be a casino, then leave it at Kawartha Downs; 3) if the City refuses to consider Kawartha Downs (which they have already rejected) then; 4) keep any casino location close to Kawartha Downs (Gateway Option) and away from an already light polluted city core; 6) the PAA is willing to work with who ever it needs to in order to address light pollution issues; 7) all Councillors were left with a copy of the PAA light pollution brochure.

Then on March 19th the PAA took advantage of a Community Workshop on the future of the Trent Lands Plan to input on the issues of light pollution and its abatement that would be associated with any development on Trent University lands. To date there had not been discussion or flagging for these issues as part of the public input process. This is currently the third of four stages in the process that started last November and will end this spring. The PAA has its marker down yet again. Once again light pollution brochures were handed out, discussions had and written submissions recorded for the record.

We will continue to monitor these issues on your behalf. If at anytime you would like to voice an opinion, question or concern, please do so through me or any of our LPAC members. The issues are never dull, but I wish they were (much duller or at least dimmer).



EARTH HOUR 2013. A view of cityscape of Peterborough from atop Armour Hill.
Photo by Rick Stankiewicz.

Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive MS 201-101
Pasadena, California 91109



March 7, 2013

Peterborough Astronomical Association
Rick Stankiewicz
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Peterborough, ON K9J 6X9
Canada

Dear Rick,

NASA's Space Place is pleased to award the Peterborough Astronomical Association the enclosed certificate of appreciation. As an active Space Place partner, your organization encourages science and technology education throughout your community. Promoting the message that learning is fun is crucial and your organization plays a vital role in this endeavor. Through your public events, you not only educate, but you also inspire your audiences, both young and old. Through your use of hands-on activities and experiences for children, you play a key part in developing tomorrow's scientists. We thank you for your outreach efforts and look forward to continuing our partnership.

Please accept this certificate of appreciation with our gratitude.

Sincerely yours,

Laura K. Lincoln
Communication Coordinator



Certificate of Appreciation

NASA's Space Place,
a NASA public education and outreach program,
recognizes

Peterborough Astronomical Association
for its valuable contributions to its community
in the areas of science, technology education, and inspiration.

2012

Nancy J. Leon
Space Place Manager



Laura K. Lincoln
Communication Coordinator

My Encounter with Marc Garneau

MICHAEL MCCARTHY

ON SATURDAY MARCH 9th I received a call to go to Karl Moher's (a friend of mine) home to meet a guest. It was a short notice as I received the call about 12:45 and was told to be at Karl's for 1:15 pm. Arriving at Karl's house I found out the awaiting guest was Marc Garneau, in the Peterborough area campaigning for the Liberal Party leadership.

It was a very informal visit with just Karl's family and myself. Marc met and greeted everyone then sat down and had a coffee. He showed great interest in the children. Questions from young to old were asked. Lauren asked "why the spacecraft doesn't crumple like tin foil when entering the atmosphere of a large gaseous planet such as Jupiter?" Marc commented he has never had that question before!!

Brad asked about nuclear power in the future? Marc asked him if he worked at Pickering and he does. Marc was aware of this issue from being on the campaign trail. Marc sees the importance of having plentiful cheap power to supplement hydro and green power technology and with advances there will be more options however; we cannot overlook the long-term half-life of spent fuel.

Jen asked about the plight of Native academics. Marc said it was an important issue as this segment of the population is the largest growing in Canada.

Lyla asked "do you believe in or have seen aliens?" Marc said he has never seen any but he does believe there are aliens of some sort somewhere. Lyla also asked "How do you sleep in space?" Marc answered "You crawl into a sleeping bag with Velcro and attach yourself into a

position you're comfortable with, some people like to orientate themselves to how we sleep on earth (parallel to the floor.)

Karl discussed platform issues and Liberal policies with Marc. When I commented on his calm demeanor, he replied his prep team for the leadership campaign tried to get him to liven it up, "show more emotion" but by nature he is a calm fellow. He also mentioned he was appointed as CAPCOM (capsule communicator), the first non-American to communicate with the shuttle crew from mission control.

We finished up with a photo opportunity and time to say good-bye and good luck. The following Wednesday I found out Marc had decided to drop out of the Liberal leadership race. With a background in engineering physics he couldn't ignore the numbers favoring Trudeau.

It was a great experience to meet such a great Canadian in such an informal way and without throngs of people clamouring around, more or less just a one-on-one with his full attention to everyone's question. Unfortunately his high-pressure schedule and commitments had him on the road to Kingston after an hour's time with us.



continued from page 4

Comets

Hidden Cost of Light Pollution

RICK STANKIEWICZ

THIS PAST MONTH HAS seen a lot of activity regarding light pollution abatement issues and opportunities. For your Light Pollution Abatement Committee of the PAA, it started with an e-mail from “out of the blue” inviting us to view a new light pollution awareness video via the following link after asking yourself, “What is light pollution?”: <http://www.insurancequotes.org/hidden-cost-light-pollution>

A review of this video posted on the “InsuranceQuotes.Org” website (Seattle) was a pleasant surprise. This is one of the companies “Hidden Cost” videos, obviously meant to educate the uninformed or unaware public on issues that affect them on the hazards of light pollution. The website also contains the transcript from the video, which is a good thing because the video is a fast paced run down of the effects of light pollution. Well done for making an informative, succinct (1:38) and thought provoking presentation of the complex issues that face all of us, yet few of us take the time to reflect on or consider how we or the environment around us might be affected. Kudos for yet another tool in educating people of the effects of light pollution. InsuranceQuotes.Org would really like to get your comments if you would view the video and let them know what you think.



The Sky this Month

Mercury is visible in the dawn sky the whole month brightening each day.

Venus emerging from superior conjunction in the western evening sky but lost in twilight. Becomes visible at the end of the month.

Mars is not visible. In conjunction with the Sun on the 18th.

Jupiter is in the western evening sky in Taurus. Sets in late evening. Waxing crescent Moon passes nearby on the 14th.

Saturn is visible most of the night in western Libra. At opposition on the 28th.

Lyrid Meteor shower peaks on the 22nd at 7h00.

Moon Phases

Last Quarter	12:00 AM	April 3
New Moon	5:35 AM	April 10
First Quarter	8:31 AM	April 18
Full Moon	3:57 PM	April 25

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Saturn

means that one side always faces the planet — just like our Moon. Iapetus is famous as the two-toned moon having one dark side and the other white. It also is home to a giant crater which gave it the nick-name of “the Death Star” from the Star Wars days.

The most exciting moon the Cassini Mission has explored is Titan, Saturn’s largest satellite. The Huygens Probe, which was launched from Cassini, landed on Titan and discovered that the moon had huge lakes made of liquid methane. Huygens also took photographs of Titan’s surface. This marked the occasion of our first landing on a moon other than our own.

Titan is so cold that water freezes to the consistency of granite and methane, which is a gas on Earth — ask any cow — becomes a liquid. There is even a methane lake on Titan named Lake Ontario because that’s what it is shaped like.

Saturn is rising in the east at sunset and its rings can even be seen through a Costco junk scope, though you’ll have to fiddle with the wobbly thing to find it.

Until we meet again, keep your outdoor lights aimed and dimmed down.

continued from page 7

Jupiter

ing how far they move in the same time interval. From our vantage, they swing back-and-forth like clock pendulums of different lengths and each has a characteristic motion. To understand the parallel, consider a grandfather clock. The pendulum speeds up toward the middle, slows down at the extremities, and pauses before changing direction. So too with each moon. To understand the challenge, consider a clear, cold, February night playing this game with frozen fingers. It took four hours to finally sort out two of the moons confirming Oscar Wilde’s remark that “success is a science; if you have the conditions, you get the result.”

References

Van Helden, A., (1989), Sidereus Nuncius, University of Chicago Press.

Your comments and questions are welcome. Send them to kenneth.james.sunderland@gmail.com.



Peterborough Local 590



continued from page 1

APOD

Center at Goddard. APOD is only a very small part of their responsibilities. They do not collaborate, but rather divide up the calendar, and each picks the image, writes the description, and includes the links for the days on his own list. The files are queued up for posting by a “robot” each day.

They use the same tools they used at the beginning: Raw HTML code written using the **vi** text editor in Linux. This simple format has now become such a part of the brand that they would upset all the people and websites and mobile apps that link to their feed if they were to change anything at this point.

Where do they find the images? Candidates are volunteered from large and small observatories, space telescopes (like the Hubble and Spitzer), and independent astronomers and astro-photographers. The good doctors receive ten images for every one they publish on APOD. But, as Dr. Nemiroff emphasizes, being picked or not picked is no reflection on the value of the image. Some of the selections are picked for their quirkiness. Some are videos instead of images. Some have nothing to do with astronomy at all, like the astonishing August 21, 2012, video of a replicating DNA molecule.

Among the many mobile apps taking advantage of the APOD feed is Space Place Prime, a NASA magazine that updates daily with the best of NASA. It's available free (in iOS only at this time) at the Apple Store

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



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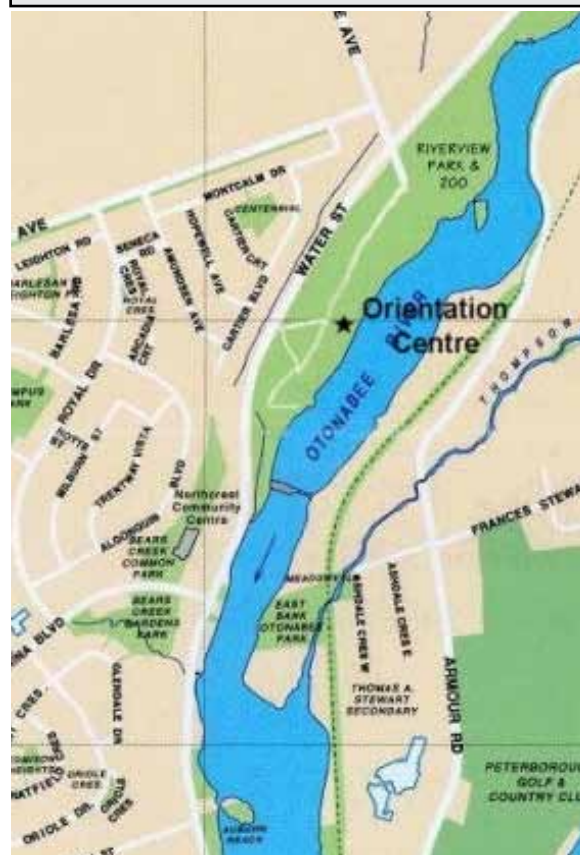
Articles

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 photos or graphics, please provide a separate file for each. Typed or handwritten 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:

APRIL 26, 2013



Meetings

The Peterborough Astronomical Association meets every first Friday of most months at the **Peterborough Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at 8 p.m. P.A.A. executive business will be conducted starting at 7:30 p.m. Members and the public are welcome to attend the earlier time.