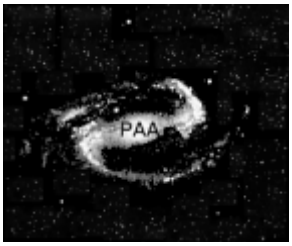
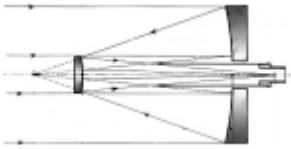
ISSN 1712-4433



PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR



Volume 3, Issue 9 November 2004

Editorial

On October 27th, a PAA entourage, headed up by Dave Duffus, gathered on Armour Hill to join the Discovery Channel's Peter McMahon in conjunction with the Peterborough Centennial Museum and Archives for a public tour of the last lunar eclipse until 2007. Fortune smiled on this group as the day's overcast skies parted in time for the show to begin. Many members had taken photos of the event, and some of them will be published here. If you have any astro-photos (lunar or otherwise) and want to share them with others, you can submit them to our *www.egroups.com* newsgroup under the 'Photos' section, or alternately, you can submit them to me, for inclusion in The Reflector.

We had finally heard the results from the CFHT/Gemini telescope contest. Unfortunately our submission did not win. The winning clubs were the *Big Sky Astronomical Soci*ety, Vulcan, Alberta (Pleiades) and *Club d'astronomie de Dorval*, Quebec (RY-Tau). My congratulations go out to these two clubs.

Our current membership year is soon coming to an end. Membership dues for 2005 will be due early in January. This would also be a good time to get more involved. Even though board elections will not be held until 2006, the council can appoint members in the interim to fill any empty positions. In particular we are looking for anyone interested in taking over as treasurer. Rene Bowe graciously volunteered to take over the post until the end of this year, so if you are interested, you would be doing the club and Rene a great favour. Please contact John Crossen or any of the club executive if you would like to join the council or simply help out. We could sure use more helping hands.

At mid-eclipse, the moon was a "grayish-orange" colour. The October 27th lunar eclipse was rated a L2.4 on the 0-4 Danjon Scale. As a comparison, the eclipse of December 1992 was nearly invisible to the naked eye and was rated an L0.

Due to our current speaker/observing schedule, our 'Annual Meeting' normally held at the first December meeting will be delayed until January 21, 2005.

Clear Skies

Charles W. Baetsen
va3ngc@rac.ca

Meeting Notes

Oct 15:

The Friday, October 15th meeting was well attended and brought with it a new member, an interesting talk on Astronomy Equipment and a short movie filled with stunning photography.

John Crossen opened the meeting with

Inside This Issue

Guest speaker Jim Kendrick demonstrates the new 'Dob Ladder' available from Kendrick Astro Instruments.

the announcement that the PAA is now an official member of the International Dark Sky Association. New member Mark Coady volunteered to head up the club's work on behalf of promoting sensible, efficient lighting in the Peterborough area. Thanks Mark.

With so many new members, the old name tags issue came up at recent meeting and they were implemented again at this meeting. The club now has 39 members, with 9 having joined us within the last three months. So it's time to sort out who's who again.

Look Mom—No Hands! Club President John Crossen tries out one of the smaller observing chairs.

Speaking of new members, we welcome Michael Fung to our membership. Michael is leaving for a canoe journey through the Grand Canyon, so if you missed this meeting, you'll have to wait until November to say "hello."

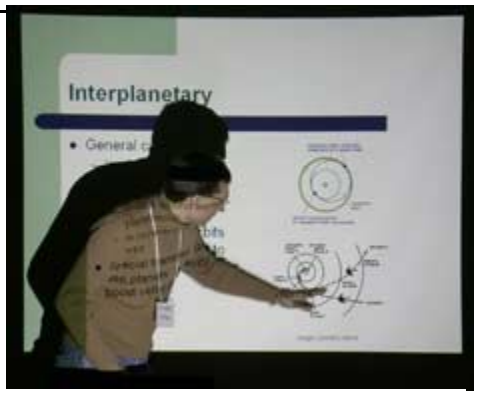
Jim Kendrick then delivered a talk on his new automatic dew prevention system with sensors that detect the dew point and automatically activate the equipment. The system can be programmed to operate in a economy mode to conserve battery power and can also be programmed to deliver different levels of heat to various elements – camera, guide scope, eyepiece, finder scope, or computer heat pad – that are in use. We had seen Jim's prototype last year, but the new working model has been in full production for the last six months and has been well received by amateur astronomers. In fact, it may well have made Sky & Telescope's 'Hot New Product' list for the year.

Jim also demonstrated his new observing chair and a prototype of a Dob ladder that will go into production soon. The chair is made of thick walled aluminum tubing so that is both lightweight and very robust. Club President, John Crossen demonstrated the chair's capability to handle up to 300 pounds by bouncing up and down on the seat. It held!

The meeting concluded with the PBS Feature Solar Max. The documentary was shot in celebration of the new millennium's arrival 4 years ago. An occasion that also coincided with the Sun reaching a solar maximum. To use the word 'stunning' in describing the film would almost be an understatement.

October 29th:

This meeting was filled with pleasant surprises. For starters, quiet and retiring



Club member, Richard Mathews, explains how satellites change orbits to get to the outer reaches of the solar system.

Richard Matthews gave one of the finest talks we have had in the last couple of years. His topic was Man-made Satellites. Richard's experience in designing components for orbiting experiments and commercial uses gave us first-hand knowledge of, and little-known facts, behind those silver bullets orbiting above us. But when he presented us with a piece of his U of T experiment that had spent about six years orbiting the Earth, we were – well – 'flabbergasted' comes to mind. Zowie, one of our members has actually been in orbit – sort of!

At any rate, it was a superb talk and we thank you very much Richard. To top it off, Richard has joined our Speaker Swap Program and is planning a second satel-

Peterborough Astronomical Association

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

Website
www.geocities.com/paa_ca

Email
paa_ca@yahoo.com

Club Mailing Address
% John Crossen
2254 County Road 507
Buckhorn, ON, Canada K0L 1J0

lite talk next spring.

Another delightful surprise walked through the door in the form of Ray Wingett. Ray was an old member who we thought had dropped out. But he's back and is threatening to rejoin us. He and Boyd Wood will have motorcycles and astronomy to swap lies about.

Speaking of new members, Linda Shephard is the newest smiling face in our tribe. Linda has already dabbled with astrophotography despite the fact that she's still learning her way around the constellations. Welcome aboard, Linda.

John Crossen presented the club with an outline of our Sky Mentor program for beginners. The Mentors are: Charles Baetsen, Colin Cross, Dave Duffus, Don McDonald and Rick Stankiewicz. Alternate sky pilots are: John Crossen, Brett Hardy and Rob Fisher. We'll send out a listing of who's teamed up with whom shortly.

Mike Ricks and John Cameron helped shuttle the gear in from the van as well as setup the library and videos prior to the meeting. My thanks to them and to Observing Director Dave 'Java' Duffus for keeping the coffee mugs filled.

November 12:

We met at the Zoo as usual last night around 8:00 p.m. There was close to 18 people out. After a bit of socializing, it was announced that Mark Coady is looking into some PAA promo items (T-shirts, mugs, etc.) at a reasonable cost. There will be more about this at the next meeting (Nov 26). Charles Baetsen was collecting orders for the RASC calendars and handbooks. The cut-off is now. There was some talk about the recent auroral displays in the last week. This even got some media coverage (always a good thing)!

Colin Cross then gave another informative and interesting inter-galactic tour, this time of Draco, Ursa Minor and Cepheus. His new light-sabre (laser pointer) was very impressive. We were all anxious to go out and observe some of what was shown to us by Colin.

Then we headed out to the observing session at Armour Hill. There were at least 6 pieces of observing equipment (various telescopes and binoculars). We were just getting into the Sky Mentoring program, when the clouds started to roll in from the west. Colin's laser pointer really shone here. We saw what we could, but by 10:00 it was all over, but the crying. There were still the opportunities to ask questions and get answers, but time was limited. The clouds win again, but not without the old college try by the members of the PAA.

Thanks to everyone who came out. An evening with the PAA is never wasted.

John Crossen & Rick Stankiewicz

Farewell Lunar Eclipse!

It was with much trepidation that the day of October 27, 2004 arrived. This was the big day of the last lunar eclipse for the next three years. Would the skies be clear? We all know the bane of an astronomer's existence is the dreaded cloud cover for a big celestial event. Most of the day on the 27th was solid cloud cover! Miraculously, after supper the clouds thinned and then we ended up with clear skies from about 8:00 p.m. onward. It was a picture perfect evening for a lunar eclipse. The moon was high in the southern sky, clear skies, a light breeze and a nip in the air (-3 degrees C). It was close to the conditions of the last lunar eclipse we experienced (November 8, 2003). It is hard to imagine having such good fortune for two such events. Of course, the importance of this October's eclipse is that it will be the last opportunity for this sort of event until March of 2007! This eclipse was much darker and longer than the one last fall too. With the moon plunging deep into the Earth's shadow, there was a marked difference in the darkening of the lunar disk during "totality". The attached

The November 2003 Eclipse. Note the lightened limb.

This year's eclipse did not have a bright limb.

two images were taken during the same period of totality. Note the lightened limb of the Moon during the November 2003 eclipse compared to this year's totality.

There were quite a number of meteors too. I did not capture any on film, but there were some nice long, slow "burners". The ones I saw appeared to be coming out the Geminid region? The odd yipping and yelping of our local coyotes sure added to the whole setting too, especially during the period of totality.

Sharing the event with some neighbours and the local wildlife, as well as capturing a few nice images for the record, made for a bonus eclipse experience. I sure hope those of you reading this, were fortunate enough to have experienced your own eclipse moment because it is fond farewell for this kind of opportunity until 2007.

Savoring the memory,

Rick Stankiewicz
stankiewiczr@nexicom.net

Are You Driving A Star Cluster To Work Today?

If there's a Subaru parked in your driveway, you are. Look at the grille of any Subaru. You'll see a design with six stars on it. Those six stars are a stylized representation of a large open star cluster called the Pleiades – or Subaru if you're in Japan.

Pronounced 'Plee uh deez,' the star cluster is an easy naked eye target during the fall and through most of the winter. To find the Pleiades in October and November, simply look towards the east on a clear, Moonless night. About 10:00 p.m. is a good time. You'll see a fuzzy spot about 10 degrees (the width of your fist at arm's length) above the eastern horizon. The cluster is shaped a little like a question mark. Others see it as a tiny version of the dipper. Call it the dinky dipper if you like. Most people can make out five or six stars, but a sharp-eyed observer will spot seven and perhaps even more.

Many a night I saw the Pleiades, rising thr' the mellow shade, Glitter like a swarm of fire-flies tangled in a silver braid' – *Alfred Lord Tennyson from his poem 'Locksley Hall.*

Sometimes called The Seven Sisters, the star cluster is said by the ancient Greeks to be the daughters of Atlas and Pleione. On a more scientific level, they are very young, bright white-hot stars. Astronomically speaking, 'very young' means that they are only 70 million years or so old. Put in another time reference, the Pleiades star cluster was born about the time the dinosaurs disappeared.

The stars lie at a distance of 440 light years from Earth. That means if you were traveling at the speed of light – 300,000 km/second – it would take you 440 years to reach the young ladies. Better add a few million years if you're driving your Subaru.

Amazing Space.
Alcyone (al-Sigh-oh-nee), the brightest star in the seven sisters is about 350 times as luminous as our Sun. It is also quite young. Our sun is about 5 billion years old. Alcyone is only celebrating her 70 millionth birthday.

John Crossen
JohnCstargazer@aol.com

In Search of Clear Skies: Part 2—The Lowell Observatory

Clear-steady skies, and lots of them, were exactly what Percival Lowell was looking for in 1894 when he decided to build a new observatory to observe Mars. Lowell became seriously interested in the Red Planet after reading Camille Flammarion's massive compendium of Mars observations, *La Planete Mars*. Lowell and Harvard astronomer William H. Pickering sent Andrew Douglass with a 6-inch Clark refractor to Arizona to find the ideal Mars observing site. He found that Flagstaff was the best site and wired back his findings to Lowell. Lowell and Pickering borrowed a pair of telescopes (a 12" Clark and an 18" Brashear refractor) from Harvard for their expedition "out west". On a ponderosa covered mesa, Pickering slapped together a prefabricated dome on what Lowell later named "Mars's Hill".

The Lowell Observatory is located just on the edge of town, but despite that, the viewing conditions are not all that bad. Flagstaff has roughly the population of Peterborough, but they have fairly strict lighting ordinances. From the top of Mars Hill, one can glance down over the town without too many offenders other than baseball stadiums and the neon lights that line the Historic Route-

The Clark Telescope Observatory is the oldest building on the site. Erected in 1896, it's "dome", constructed out of ponderosa pine, protects the 24-inch Clark scope used by Percival Lowell for his Mars research.

Some of Lowell's Martian Globes. Percival Lowell, obsessed with the Martian Canals he thought he saw, strongly believed that there really were Martians. HG Wells used this idea in his famous sci-fi novel the *War of the Worlds*.

The 24-inch Clark Telescope was Lowell's primary observing instrument. Designated a national historic landmark, the Clark scope is now used for public education.

66. Looking up, one can see the Milky-Way reasonably well. The site is not as dark as the skies are at Chaco, but it shows dramatically how proper lighting can help preserve the night sky.

Currently, there are five observatories on Mars Hill. The two most famous, house the 24"-Clark Telescope and the Pluto Discovery Telescope. The Clark Telescope Observatory is the oldest building on the site. Erected in 1896, it is a wooden building with a large "dome", constructed out of ponderosa pine. The 24"-Clark telescope has a rich history and is listed as a national historic landmark. Initially, it was used by Lowell to study and sketch the "Martian canals". Later, in 1912, it was fitted with a spectroscope by Dr. V.M. Slipher, who discovered the radial velocities of "spiral nebulae". This data (along with galactic distances) was later used by Edwin Hubble as evidence for the Big-Bang theory. In the 1960's this scope was used to map the moon, in preparation for the lunar landings. Today this venerable scope is used as a public education tool.

The 13"-astrograph or Pluto Discovery Telescope is housed in a separate observatory at the site. Installed on Mars Hill in 1929, this telescope is no bigger than the telescopes used today by many amateurs, however this wide field scope enabled Clyde Tombaugh to discover the planet Pluto in 1930. The search for Planet-X was one of Lowell's other passions. Earlier he predicted the discovery of a ninth planet and spent many years searching for it. Unfortunately he died long before its discovery. Pluto was named after the Roman god of the underworld, by a British girl because the planet was so cold and so far away from the Sun.

The 13-inch astrograph, otherwise known as the Pluto Discovery Scope, is housed in this smaller observatory. Clyde Tombaugh used it to discover the planet Pluto in 1930 posthumously fulfilling one of Lowell's dreams to find Planet-X.

The Lowell Observatory also played an important roll in America's quest to beat the Soviets to the Moon. The 24-inch Clark scope was used to produce detailed maps of possible landing sites.

Since even a bit of light-pollution is the bane of serious astronomers, there are six additional telescopes used for scientific observation at their dark(er)-sky site on Anderson Mesa, 14 miles southeast. Included at this new site are the 72-inch Perkins, 42-inch Hall, 44-cm Lowell Observatory Near Earth Object Survey (LONEOS) Schmidt, and a 31-inch telescope. Lowell jointly operates with the U.S. Naval Observatory, the Navy Prototype Optical Interferometer which be used to measure stellar diameters.

The Lowell Observatory is well worth the visit if you are in the area. Besides touring the grounds during the day, the Observatory offers sky tours at night. It also has a wonderful museum and gift shop.

Clear Skies

Charles W. Baetsen
va3ngc@rac.ca

Next Month: Part 3 - Meteor Crater

Your Guide to the 10 Brightest Stars: Part 3

3. Alpha Centauri:

Alpha Centauri (or Rigel Kentaurus, as it is also known) is actually a system composed of three gravitationally bound stars. The two main stars are Alpha Centauri A and Alpha Centauri B. The tiniest star in the system is a red dwarf known as Alpha Centauri C.

The Alpha Centauri system is a special one. At an average distance of 4.3 light-years, these stars are our nearest known neighbors in space beyond the solar system.

Centauri A and B are remarkably sunlike, with Centauri A being a near twin of the sun
(both are yellow G stars). In comparison with the sun, Alpha Centauri A is 1.5 times as luminous and shines at magnitude -0.01 while Alpha Centauri B is half as luminous and shines at magnitude 1.3.

Alpha Centauri C is 7,000 times fainter and shines at 11th magnitude.

Of the three stars, the smallest is the closest star to the sun. At 4.22 light-years away, it would take 4.22 years traveling at light speed to get to Alpha Centauri C. Because of its proximity, it is known as Proxima Centauri.

When night falls and the skies are clear, the Alpha Centauri system shines at a magnitude of -0.27 low in the southern sky during the summer months. You can find it at the foot of the Centaur in the constellation of Centaurus.

Because of its position in the sky, the Alpha Centauri system is not easily visible in much of the Northern Hemisphere. An observer must be at latitudes south of 28 degrees north (or roughly from Naples, Fla., and locations further south) to see the closest stellar system to us.

The two brighter components of the system make a wonderful double star to observe in a small telescope.

Naked-eye Alpha Centauri appears so bright because it is so close. This also means that it has a large proper motion — the drifting of stars relative to each other due to their actual motion and direction in space. In another 4,000 years Alpha Centauri will have moved near enough to Beta Centauri for the two to form an apparent double star.

Rick Stankiewicz
stankiewiczr@nexicom.net

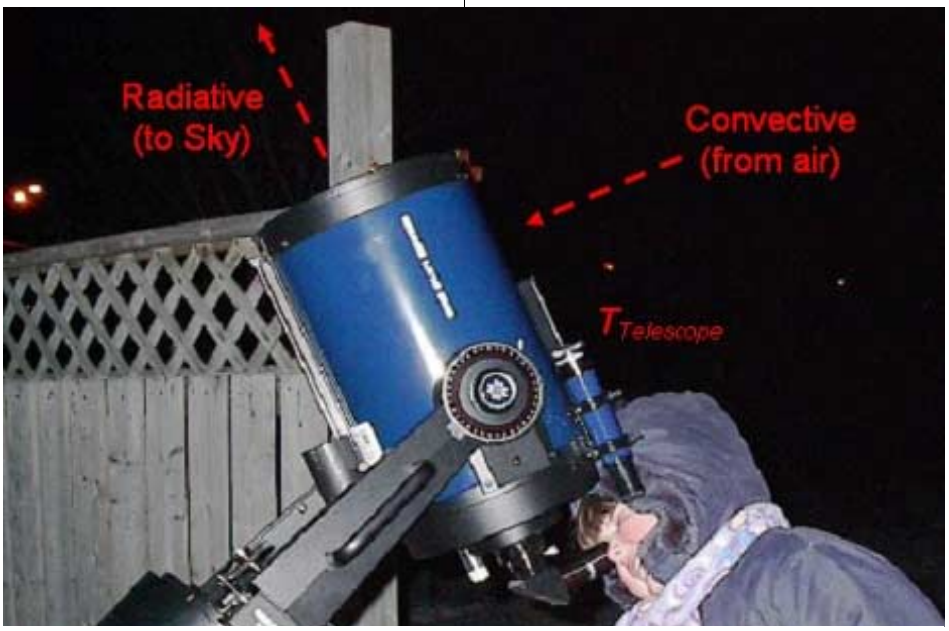
Radiation Cooling and the Dewing of Telescopes

There is no greater frustration for an amateur astronomer than having a perfectly clear night sky ruined when your telescope begins to dew over. Reluctantly you pack up your equipment for the evening. This can very likely occur even when the air temperature is many degrees above the dew-point. This article will attempt to explain why this happens and ways to reduce the chances of dewing. The reason dewing occurs is that the temperature of the telescope drops to the dew-point temperature or below because of radiation cooling. However if the air temperature is also below the dew-point then without artificial heat there will always be dew.

In the figure below we see the main processes of heat transfer that affect the temperature of the telescope. The telescope is warmed by the air surrounding it through convective heat transfer. The telescope is cooled by radiation heat transfer to the sky. The temperature of the telescope tube will change until an equilibrium temperature is reached when both of these processes become equal. Let us assume the air temperature is 283°K which is 10°C. On a clear night the sky temperature is much colder than the air temperature and we have used a typical value of approximately 250 °K which is –23 °C. The temperature of the telescope will always satisfy the following inequality.

$$T_{sky} \leq T_{telescope} \leq T_{air}$$

As a special case, suppose the sky is cloudy then approximately $T_{air} = T_{sky}$, so the telescope temperature will be close to either of these. There is then little



The heat from your telescope, corrector plate or eyepiece, will be lost to the sky through radiation and gained from the surrounding air via convection.

convective and radiation heat transfer.

In general, the rate of convective heat transfer to the telescope is given by the formula:

$$Q=h(T_{air} - T_{telescope})$$

Where h is the convective heat transfer constant. This constant depends mostly on the nature of the surface of the telescope and the wind speed.

The rate of radiation heat transfer from the telescope is given by the formula

$$Q=\sigma\varepsilon(T^4_{sky} - T^4_{telescope})$$

Where σ is the Stefan-Boltzmann constant (5.67×10^{-8} W/m^{2}K^4), and ε is the emissivity of the surface of the telescope. The emissivity of the telescope depends on the material the telescope is made of and its degree of polish. We set these two expressions equal and solve for the equilibrium temperature of the telescope, $T_{telescope}$.

Looking at a table 1, we see that common materials have a high emissivity except polished metals. This suggests our telescope tube should be unpainted polished metal. With high emissivity glass lenses, eyepieces and mirrors dew will form more quickly so they need extra shielding provided by dew shields. The dew shield actually reduces the portion of the sky visible from the lens so that less radiation cooling occurs.

Table 1: The emissivity (ε), of common materials used in telescopes.

Material	Emissivity (ε)
Glass	0.9
Polished metals	0.05
White paint	0.8
Black paint	0.9
Wood	0.9
Aluminum paint	0.5

In the table 2, we list several emissivities across the top and several heat transfer constants down the side. The remaining entries in the table show, $T_{air} - T_{telescope}$, the number of degrees the telescope temperature is below the air temperature. For example, an emissivity of *0.70* with a heat transfer coefficient $h= 2$ yields a temperature difference of 19 degrees! That is, the temperature of the telescope is 19 degrees below the air temperature. It is also clear from the table that halving both the emissivity (desirable) and heat transfer constant h (undesirable) does not change the equilibrium telescope temperature. The smallest temperature difference occurs near the lower left portion of the table where the emissivity is lowest and the convective heat transfer constant h is the largest. On the other hand the greatest temperature difference occurs near the upper right corner of the table where emissivity is high and convective heat transfer is low.

Our goal is to make the emissivity (ε) as small as possible and the convective heat transfer constant (h) as large as possible.

The convective heat transfer constant h in still air is approximately 6 but can increase to 20 or so in a 10 mph wind. Consequently there is much less chance of dewing. This seems to agree with experience.

It is noteworthy from the table that for a heat transfer constant $h=0$ the temperature difference $T_{air} - T_{telescope}= 33$ which makes $T_{sky} = T_{telescope} =-23$ °C! In other words with no heat from the air the telescope will cool by radiation until its temperature equals the sky temperature.

Anton Jopko
amj@kwic.com

Table 2: ($T_{air} - T_{telescope}$) as a function of the heat transfer coefficient (h) and emissivity (ε), in degrees C.

Heat transfer constant (h)	Emissivity (ε)							
	0.00	0.05	0.10	0.20	0.30	0.50	0.70	0.90
0	0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
2	0	3.16	5.70	9.56	12.4	16.3	19.0	20.9
4	0	1.68	3.16	5.70	7.79	11.1	13.6	15.5
6	0	1.14	2.19	4.06	5.70	8.41	10.6	12.4
8	0	0.87	1.68	3.16	4.49	6.79	8.71	10.3
10	0	0.70	1.36	2.59	3.71	5.70	7.40	8.88
15	0	0.47	0.92	1.78	2.59	4.06	5.39	6.58
20	0	0.36	0.70	1.03	1.99	3.16	4.24	5.23

Mark Coady Chairs PAA Light Pollution Committee

Amateur astronomers are all familiar with the gremlins of light pollution. In Toronto the stars are all but washed completely out of the night sky. And even in smaller burgs like Peterborough, the stars are dimming in the battle for dark skies. But astronomers aren't the only ones promoting curbs on light pollution. From a financial aspect, lighting up bird bellies and cloud bottoms is not only a waste of light, it's a monster waste of money and a non-renewable resource. There are other important concerns, too. Like the effect lighting can have on bird migrations as well as animal and habitat concerns. And then comes the human element. We, like all other animals, are used to a cycle of dark and light for sleeping. Take away the dark, and the cycle is stressed.

Mark Coady has agreed to head up the PAA's Light Pollution Committee.

Astronomical groups as well as environmentalists are leading the battle for sensible lighting. Shielded lights that direct the light down where it is needed. Lighting that doesn't try to turn night into day, but respects the need for darkness. And lighting that is not only responsible to our environment, but more affordable in these times of rising electrical costs.

It's a big task, and for the PAA, Mark Coady has stepped up to grab the bull by the horns. We'll kick off our light pollution program in the new year, when Ian Wheelband will join us to give a talk on his successful work for his astronomy group, DRAA. We'll also be looking for a few other members to support Mark with their time and efforts. So, think about it. Wouldn't it be nice if your grandchildren could actually see the stars instead of asking what that funny white tube is in Grandpa's garage?

An example of full cut-off lighting used in Flagstaff, Arizona. Flagstaff is roughly the same size as Peterborough, yet one can easily see the Milky-Way, even in town.

In the mean time, we have a couple of video tapes available from the International Dark Sky Association in Tucson – where you can actually see the Milky Way from downtown. So light abatement does work, and no one is left standing in the dark. Thanks Mark, for tackling such a big task. Now let's get behind Mark, gals and guys. He can't do it all alone.

John Crossen
JohnCstargazer@aol.com

The Sky This Month

MERCURY

Mercury will be an evening object throughout November. It will be best around November 21st.

VENUS

Venus is a brilliant morning object this month. It will be high in the East for the rest of the year.

MARS

Mars is not visible at this time.

JUPITER

Jupiter is visible in the morning hours.

SATURN

Saturn rises at after dark and is visible in the constellation Gemini.

URANUS

Uranus is located in Aquarius and will be visible throughout the month. Finder charts are advisable to locate this 5th magnitude planet.

NEPTUNE

Neptune is located not far from θ-Capricorni. It will be visible throughout the month. Finder charts are advisable to locate this 7th magnitude planet.

PLUTO

Pluto is not visible at this time.

METEOR SHOWERS:

Leonids: Peak on Nov. 17

There are several minor meteor showers this summer. For details on these see *http://comets.amsmeteors.org/meteors/calendar.html.*.

Astronomy in Philately

Some of the first communications satellites were designed to operate in a passive mode. Instead of actively transmitting radio signals, they served merely to reflect signals that were beamed up to them by transmitting stations on the ground. Signals were reflected in all directions, so they could be picked up by receiving stations around the world. Echo 1, was launched with a Delta 2 rocket by the United States on August 12, 1960. At launch it was contained in a 66 cm (26 in) magnesium sphere that released and inflated in space to over 30 m (100 ft). Echo I, was the largest communications satellite of the day and consisted of an aluminized plastic (Mylar-coated) balloon, resulting in 98% reflectivity. The capacity of such a system was severely limited by the need for powerful transmitters and large ground-based antennas. Prior to this, the Moon was used as a passive reflector of radio signals. The Echo satellites paved the way for more sophisticated communication systems.

On December 15, 1960, the U.S. Postal Service issued a commemorative stamp for the achievement of what Echo I accomplished and stood for, "world wide communications through space". This was highlighted on the first day cover design. The attached sample of the cover shows a close up of the stamp and cancellation area only. The Postmaster General was to have said, "…this represents an initial and

Issued on December 15, 1960, this first day cover commemorated launch of the Echo 1, communications satellite.

potentially a most significant and historic advancement in world communications for peace, …".

If you look closely at the stamp design you should be able to pick out the "error". Do you see the "clouds in space"? There should not be any clouds up where Echo I was located (1500 km). The world has come a long way in 44 years with satellites and communications, but it would appear that "peace" is a lot more difficult to advance.

Your Astronomical Philatelist
Rick Stankiewicz
stankiewiczr@nexicom.net

Richard Matthews' Satellite Presentation is Just the First…

There's nothing like the voice of experience to bring a story home with a solid thump. And Richard's experience with satellites began at the University of Toronto during an experiment to test the durability of different materials when exposed to the ultraviolet and cosmic rays that bombard objects beyond Earth's protective atmosphere. The results were fascinating, and Richard brought a sample with him that had actually been part of he experiment.

Originally intended to last for two years, the experiment actually took a total of 6 years due to funding cuts and shifting political/military/science objectives. But finally, after a greatly extended tour in one of the harshest environments imaginable, the satellite was de-orbited and scientists could begin analyzing the results.

Richard also took time to explain the different types of orbits satellites are inserted into and how different types of orbits are better suited to satellites serving different functions. While we were all familiar with the Low Earth Orbits (LEOs) that many weather and military observation satellites take, we were surprised that the TV satellites are orbiting at a distance of 36,000 km. Mr. Roger's neighborhood is quite a hike from your new wide-screen TV. Ditto that for Ma Bell and Express View.

Towards the close of his talk, Richard took us on a tour of a typical satellite and pointed out many key elements that all satellites must share.

It's an exciting journey and we are delighted to count Richard among our members and to have benefited from such wonderful first-hand experience. Now about that next talk…chapter two. Sometime next spring, maybe?

John Crossen
JohnCstargazer@aol.com

Discovery of the Planets: Part 2

Uranus:

In 1781 a self-taught astronomer, William Herschel, was "sweeping the skies" with his telescope. By March, he had reached the section that included the constellation Gemini and he spotted an object that appeared as a disk rather than a glowing star. Because this disk moved slightly from week to week, Herschel thought it was a comet. After a few months however, he decided the orbit was circular and came to the conclusion that it wasn't a comet after all, but an unknown planet.

No one since ancient times had named a planet. Herschel felt that it should be called "Georgium Sidus" (Georges's Star) in honour of his patron, George III – the king of England who reigned during the American Revolution. Some others wanted to name it "Herschel" after its discoverer. But on influential astronomer of the day suggested it be called "Uranus" after the Greek god of the heavens. That made sense, since this new planet was at the limit of the then known universe. Or so they thought!

Rick Stankiewicz
stankiewiczr@nexicom.net

ARTICLES

Submissions for *The Reflector* must be received by the date listed below. E-mail or "sneaker-net" (i.e., floppy disk) submissions are preferred (Microsoft Word, ASCII and most graphics formats are acceptable). 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 this address:

Charles Baetsen
4094 Squair Rd
Orono, ON
L0B 1M0

or via e-mail at:
va3ngc@rac.ca

NEXT ISSUE'S DEADLINE IS

Dec. 6th, 2004

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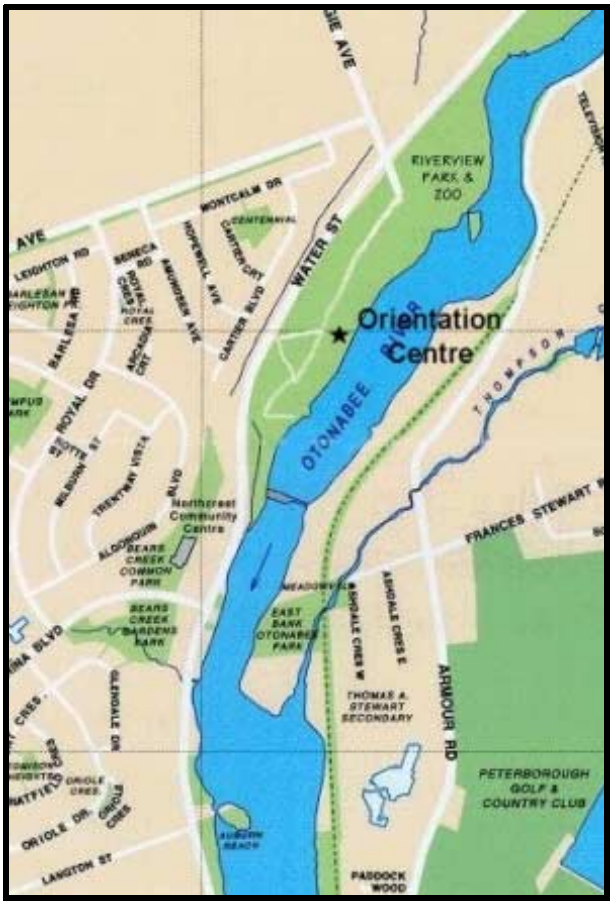
MEETINGS

The Peterborough Astronomical Association meets every second Friday at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **8:00 pm**.



CALENDAR OF EVENTS

November 12, 2004	**General Meeting** — Observing Session – Armour Hill
November 26, 2004	**General Meeting** — Charles Baetsen – In Search of Clear Skies: The Southwest
December 10, 2004	**General Meeting** — Observing Session - Don McDonald's
December 24, 2004	**No Meeting**— Christmas Eve

MOON PHASES

Last Quarter (☾)	**November 5**	**December 4**
New Moon (●)	**November 12**	**December 11**
First Quarter (☽)	**November 19**	**December 18**
Full Moon (○)	**November 26**	**December 26**