

### Editorial

As we prepare for the new year, the PAA will have some big changes. One of those changes being that John Crossen officially steps down from his position as our PAA President at the end of this month. I'm writing on behalf of the club to thank you for all of your hard work! It's greatly appreciated!

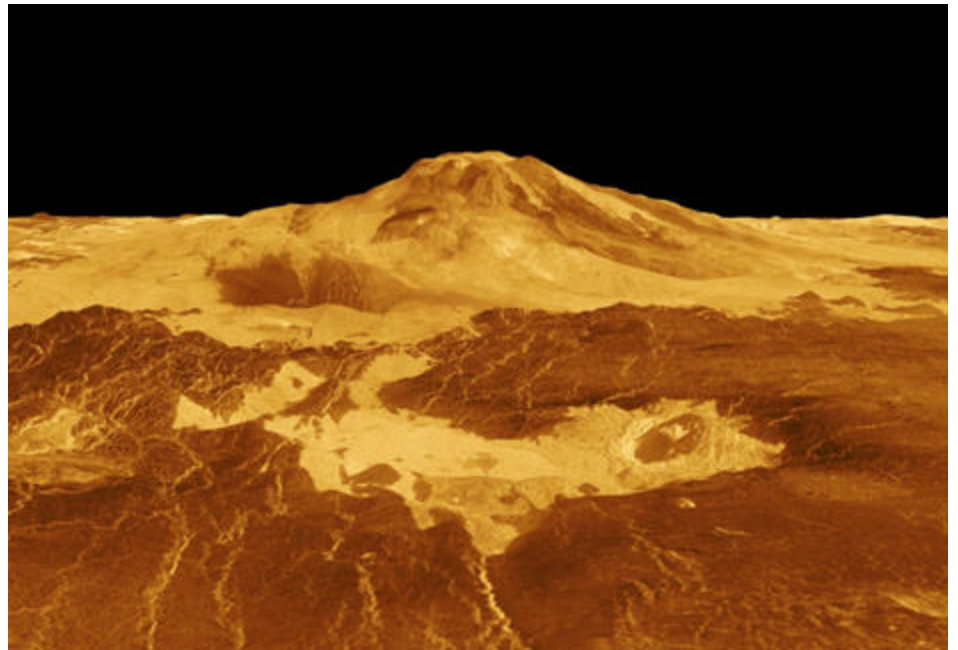
Shawna Miles  
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### Vesper Will Be Going To Venus

Venus. It's almost the same size as the Earth and has been called "Earth's twin." But it's not a very nice twin. At only about 30% closer to the sun than the Earth, Venus is an inhospitable place, some prefer to call it "hellish."

Scientists had once thought Venus might be a jungle planet with plenty of life. When the first space probes went to Venus in the 1960's, they found the complete opposite. We now know that Venus is *not* a jungle, let alone able to support life. It has searing deserts with no water, and the surface has an atmospheric pressure of about 100 times that of the Earth. A rainy day on Venus would be deadly, with droplets of sulfuric acid falling down. On a clear day, the average temperature outside is around 800 degrees Fahrenheit! And everyone complains about the air conditioning bills here on Earth!



Picture of Venus taken by Magellan. Image credit: NASA

Well, now that you know more of a background, you can understand why there has not been any rovers sent to Venus. That's where Vesper comes in. Vesper is a new spacecraft still in the making and could be orbiting Venus in March 2015, where it will stay for about 2 years. It will have instruments on board to analyze the planet's atmosphere and hopefully get to the bottom of the many mysteries of Venus. Some of these mysteries would include: How the atmosphere of a supposed Earthlike beginning ended up in its current, hostile state. Although the sur-

face hardly rotates, there are clouds that move around the planet at over 200 miles per hour. What is driving them? And yet another would be the spinning clouds resembling twin hurricanes, side by side, that exist at each pole. What are they and what causes them? Vesper may just tell us, but we will have to wait!

For more information go to: <http://www.nasa.gov/centers/goddard/news/topstory/2006/vesper.html>

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### Inside This Issue

- EDITORIAL
- ALOHA #8 - NASA INFRARED TELESCOPE FACILITY (IRTF)
- HUBBLE FINALLY GETS LIFE SUPPORT
- THE SKY THIS MONTH
- ON A TRIP TO MARS, WHAT GOES AROUND COMES AROUND
- COL. CHRIS HADFIELD ON "RESEARCH IN SPACE"
- NASA SPACE PLACE - STAGGERING DISTANCE
- MEETING NOTES

## PAA Member to Fly to Mars

Well, not exactly, but his name will. In August of 2007 a spacecraft called "Phoenix" will be launched towards the red planet to arrive in May 2008. It will land in the polar regions and will explore the ice cap and drill into it. Affixed to the deck of the lander will be a mini-DVD containing the names of all members of the Planetary Society. This mini-DVD will be visible during all calibration images taken by the Phoenix camera system. The PAA's Light Pollution guru, Mark Coady, is a member of the Planetary Society and will have his name included on the mini-DVD. So, I guess if you see the mini-DVD during these calibration images you can wave at a fellow PAA member who, with apologies to Gene Roddenberry, has gone farther than anyone has gone before.

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## On A Trip To Mars, What Goes Around Comes Around

In 2008 astronauts will be toasting each other with glasses of water distilled from urine, sweat, and atmospheric humidity. While that may make the squeamish cringe, our space travelers will also be inhaling a recycled version of the air they just exhaled as carbon dioxide. It's called a closed loop environment. And it is absolutely essential if we are to stretch our space legs to colonize the Moon, Mars, and beyond.

The reasoning behind this "extreme recycling" has to do with money and storage space. At thousands of dollars per ounce, it's too expensive to launch heavy commodities like water into space. Plus, stowage is limited inside a space ship. Thus, all that the astronauts exhale and secrete will be recycled and reused.



*Mercury, our solar system's innermost planet, is silhouetted against the Sun as a tiny black dot. It is just to the lower left of centre, beneath a gigantic sunspot.*

*Photo taken by SOHO/NASA.*

There's really nothing new about that. The Russian space craft Mir and Salyut condensed moisture out of the air then used an electric current run through the water to produce oxygen for breathing. Now NASA is taking that technology a giant step farther.

Scientists and engineers at the Marshall Space Flight Centre are finalizing a water and oxygen regenerative system as part of a project called Environmental Control and Life Support Systems. It goes by the acronym ECLSS (pronounced EE-cliss) and is remarkably efficient. ECLSS can recover 100 percent of the moisture in the air, and 85 percent of the water in urine, resulting in a net overall recovery efficiency of 93 percent.

But all that recovered water isn't for drinking. The ECLSS must also

supply water to the Oxygen Generation System (OGS). The OGS operates by electrolysis, splitting water molecules into oxygen and hydrogen. The hydrogen is vented into space, while the oxygen is circulated inside the space ship. Simple, eh? Of course not.

All this must be done in a microgravity environment. Thus, the ECLSS is spun to create artificial gravity so that steam from the boiling urine and will rise into the condensation chamber where it cools and becomes water again.

Microgravity also provides an additional challenge to the air filtration system for ECLSS. On Earth hair, dander, skin cells, lint, and other impurities fall to the floor. Not so in the near-zero gravity of space. Suffice it to say that the ECLSS air filtration system is exceedingly efficient.

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ECLSS will be tested on the ISS starting in 2008. It will produce a half gallon of water every hour. That's twice what is required by the current ISS crew of three. And the water meets purity standards that are higher than most Earthly municipal water systems.

I'd say "bottoms up." But in space there is no up or down. So until we meet again in the backyard, keep your lights down low and the stars up big and bright. You'll save money, energy, and the beautiful Kawartha night sky.

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## Planets, Meteors, And An Occultation Are Among December's Christmas Gifts

We're about to enter December, "the season without reason", but just in case you find a few spare moments to look up on a clear night, there's a fair bit to see. Best of all, you don't need a telescope to see it, so everybody gets a shot at the fun.

Early in the month Mercury, Mars, and Saturn will provide a spectacular grouping for early risers. Break out the binoculars for a stunning sight. Then, just four days later, the Geminid meteor shower begins. All you need to watch it are your eyes, lots of hot coffee, and a comfortable chair piled high with warm blankets. December winds down with the Moon occulting (passing in front of) the Pleiades star cluster. It's a naked eye event, but binoculars will make it even better.

December's issues of the Lakefield Herald will also feature a series of articles on Christmas telescopes and what to buy the astro-nuts on your Christmas list. Some call it my annual Junk-Scope Rant, but I'll try to be helpful with lots of alternative suggestions.

Here's what you can look forward to as pre-Christmas eye-candy.

**Dec 4** – Full Moon – observe the long impact trails stretching out from crater Tycho. The bright moon washes out most of the constellations, so you're Moon struck – like it or not.

**Dec 9** – Mercury, Saturn and Mars form a 1-degree triangle in the predawn sky. Rise and shine early for this binocular sight.

**Dec 10** – Mercury will be 10 arc minutes north of Jupiter and the Moon will be near Saturn. Sorry, it's another pre-dawn event for early risers.

**Dec 11** – Yawn, hey sleepyhead, Mercury, Mars and Jupiter are again within a 1-degree triangle. Break out the binocs and a mug of hot coffee.

**Dec 12** – Last Quarter Moon won't rise until the wee morning hours, so it's a good night for stargazing. You can start right after supper.

**Dec 13/14** – The Geminid meteor shower peaks overnight. Expect 50 to 60 meteors per hour. Most will radiate from the direction of constellation Gemini. A star chart will help – check out SkyNews Magazine or [www.OrionTelescopes.com](http://www.OrionTelescopes.com)

**Dec 18** – The Waning Crescent Moon will be about 5-degrees south of a Jupiter/Mars pairing prior to sunrise.

**Dec 21** – Happy Winter everyone. It's winter solstice, but a tad too nippy for you Druids to dance naked in the woods.

**Dec 27** – First Quarter Moon is a great target for binoculars or any small telescope.

**Dec 31** – The waxing gibbous Moon will occult the Pleiades during the morning hours, so put on the coffee and break out the NoDoze.

If you'd like a sky chart, I recommend a copy of SkyNews, Sky & Telescope Magazine, Astronomy Magazine,

or Night Sky Magazine. All are available at Chapters and some large news stands. Internet folks can visit [www.theskytonight.com](http://www.theskytonight.com) for an interactive sky chart. For a star chart that you can print off and take outdoors try [www.oriontelescopes.com](http://www.oriontelescopes.com) and you can quickly download December's dots.

Until we meet again in the backyard, keep your lights down and the stars up bright. You'll save money, energy and the beautiful Kawartha Night Sky.

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## Aloha#8 – NASA Infrared Telescope Facility (IRTF)

As we continue our tour of what you find on top of Mauna Kea, next to the Keck Telescopes, at 13,675 ft (4,168 m), sits the NASA Infrared Telescope Facility (IRTF), with its 10 ft (3 m) diameter mirror. It is operated by the University of Hawaii, out of Hilo. This allows the University about 15% of the operating time of the facility to be used by the staff and students. It saw first light in 1979, so it is one of the three oldest telescopes on Mauna Kea. This telescope with its 13.7 in (34.5 cm) thick mirror operates in the infrared wavelength, not as an optical scope.

This telescope is the only ground based scope dedicated to the support of NASA spacecraft missions and basic solar system research, such as the study of asteroids, comets and planetary objects. Its roll is roughly split in half for these purposes. This past July 5<sup>th</sup>, it was used to study Potentially Hazardous Asteroid 2004 XP14. Apparently, the study of the Jovian moon, Io, has been a particular focus for over 15 years. This scope has also been assisting in NASA's Cassini mission, mapping the Martian atmosphere and studying the make-up of

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*This image shows the IRTF's unique shape if a classic silver dome atop a square first story level. It is located as part of the grouping toward the north, that includes Subaru and Keck I & II. It's dome opened, as the sun had set on our tour, so some of the facilities were gearing up for a night of observing. Notice the silhouette of 10,023 ft (3,055 m) Haleakala, on the island of Maui, poking through the clouds in the background. This all added to the magic of our visit to Mauna Kea.*

comets and asteroids. The facility has also determined that Pluto is currently the only Kuiper Belt object with an atmosphere.

For more information about the NASA IRTF, check out their website: <http://irtfweb.ifa.hawaii.edu>

#### News Break:

As of October 26, 2006, there was a report from the IRTF that indicated that they were fine after a recent Hawaiian earthquake. A 6.7 magnitude earthquake struck near the South Kohala Coast on October 15, at 7:07 AM., a 6.0 magnitude earthquake followed this at 7:14 AM. There were numerous aftershocks in the days after Oct. 15. The IFA facilities in Hilo did not suffer any significant damage, although the Waimea facilities of Keck and CFHT did have extensive damage. A visual inspection of the IRTF revealed no perceptible damage, although the earthquake had knocked over many small items.

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## Affordable astronomy Gifts Go Way Beyond Telescopes

There are hundreds of astronomy gifts that the astronomy-challenged buyer can purchase for his or her favorite stargazer, no matter what the observer's level of skill. What you need to know is where to look. That's because the good stuff isn't at your department store or any of the big box stores. You need a specialist.

In Toronto, try EfstonScience ([www.telescope.ca](http://www.telescope.ca)), Kendrick Astro Instruments ([www.kendrick-ai.com](http://www.kendrick-ai.com)), and Khan Scope Centre ([www.khanscope.com](http://www.khanscope.com)).

Near Ottawa is Focus Scientific ([www.focusscientific.com](http://www.focusscientific.com)) with lots of gift ideas for beginners as well as advanced star-nerds.

All of the above retailers will ship goods to you, and what a load of goodies they stock! You'll find everything from space posters, Mars and Moon globes, Binoculars, Books, and Red LED flashlights, to DVD's and astronomy Software like Starry Night.

Other prime websites in Astronomical SantaLand are [www.shopatsky.com](http://www.shopatsky.com), [www.oriontelescopes.com](http://www.oriontelescopes.com), and [www.astronomy.com](http://www.astronomy.com). Visit them and you also discover astro-hats, T-shirts, pens, mugs, all kinds of inexpensive gifts that'll put stars in the eyes of your friendly local Einstein.

Until we meet again in the backyard or bump into each other in an astro-shop, keep the lights down and the stars up big and bright.

Happy shopping,

Santa



*Everything in this photograph is available at one of the shops or websites listed - and that includes the posters in the background. Don't forget a gift subscription to an astronomy magazine. Night Sky and SkyNews magazines target the beginner. Both are well written and contain lots of "how-to" articles and observing tips along with monthly star charts and sky event calendars. Night Sky even has an ongoing glossary of astronomical terms to help beginners learn the jargon.*

## Two New Snappy Cappers Awarded For Their Service

Our October 27<sup>th</sup> meeting saw two of our members awarded fabulous Snappy Caps for their outstanding service to the PAA.

First on our list that night was Dave Duffus, who over the past three decades kept the Peterborough Astronomical Association alive and well as a club serving the Peterborough area. Dave was the club's first and only President for a total of 27 years. That's a long time to be the only horse pulling the wagon. As an added little perk, Dave was granted Lifetime Membership in the PAA. Yet another first!

While Dave was busy with a multitude of PAA responsibilities, our other Snappy Cap achiever, Shawna Miles, was busy being born and growing up. Shawna came to us a couple of years ago and eventually took over the editing and assembly work for the club newsletter, The Reflector. Shawna has a keen interest in the sciences – especially chemistry, biology and astronomy. She is also an excellent writer, so she bundled up those skills and agreed to be the newsletter's Editor.

I thank Dave and Shawna for their dedication to the club (insert applause



Dave Duffus and Shawna Miles were welcomed to the *Loyal Order of Snappy Cappers* at our last meeting. Others to receive the honor include Boyd Wood, Colin Cross, Susan Coady, and Bob and Joanne Stockton. Well done.

here). We are all better because of you. Oh yes, and a tip of the Snappy Cap to Jim Kendrick for supplying our bounty of beautiful beanies.

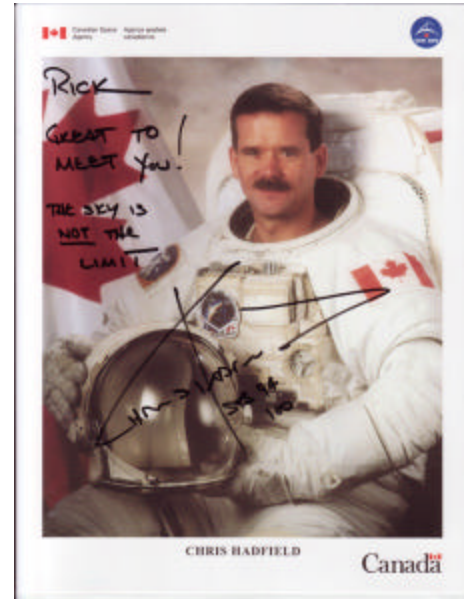
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## Col. Chris Hadfield On "Research In Space"

On October 26, 2006, Peterborough was doubly lucky to have Canadian astronaut Chris Hadfield talk at two different venues. The first was a free talk at Trent University in the morning (covered in the last issue of the Reflector). The second talk was in the evening at St. Peter's Secondary School. It was this session that I was able to attend and will report on in this article. Even though there was an admission fee of \$5.00 for those that were not members of the local chapter of Osteoporosis Canada, I would have gladly paid more. The talk was very informative and Colonel Hadfield was very engaging and personable. For this talk the program was entitled, "Space and Osteoporosis: What's the connection?". I plan to highlight a few of the interesting facts and comments that were presented during his talk. I talked briefly with Col. Hadfield about the Canada Post stamp issues that featured all eight of Canada's astronauts in 2003. He said that when they took the pictures for the stamp in their space suits, this was the only time that all of Canada's astronauts had ever been together in one place, nor have they been since. There was also an image of the Canadarm and he mentioned that he actually had taken the picture on one of his Shuttle missions.

According to Col. Hadfield, research has proven some amazing facts, like:

- \* As soon as you become weightless, your body starts to lose calcium



- \* From the first time your urinate in space, you lose bone structure
- \* Everyone (regardless of sex or age) loses about 2% of their bone structure per month (starting with the weight bearing bones)
- \* Once back on earth and under the influence of gravity, everyone starts to automatically gain bone structure, at a rate of 1/3 per month (it takes 3 time longer to gain, than lose bone mass)
- \* It is as if your body knows that a skeleton is not needed in space, so it starts to immediately shed it
- \* It is not a matter of taking supplements either, as taking them does not reverse or change the bone loss.
- \* The answer to stemming bone loss in space appears to be "loading up" the muscles and bones of your body through exercise (min. 2hrs/day/7 days a week), will just hold the bone loss process
- \* You have the potential to grow in height when in space, this

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happens because the disks between your spinal vertebrae expands, resulting in a maximum extension of up to two inches (5 cm)

- \* The space suits for doing space walks weigh about 300 lb (136 kg), but in the weightlessness of space you float inside them too. It is like working inside a balloon.

Did you know? “Space” is a very difficult place to work, not because you are weightless, or that there are cosmic rays but because it is so distracting with all the beautiful sights you encounter. In fact, the transition from Shuttle to the International Space Station is “absolutely mind numbing”, to quote Hadfield.

Q. What is an astronaut’s favourite pas-time?

A. Watching the world go by!

Stay tuned for the next of Canada’s astronauts to appear in the Peterborough area. We have had several in the last few years, so let keep our fingers crossed that this is a pattern that will repeat itself.

Your space correspondent,

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## Hubble Finally Gets Life Support

The Hubble Space Telescope (HST) has been called the most valuable scientific tool of the 21<sup>st</sup> Century. So when the Sean O’Keefe, the previous head of NASA announced that the prospect of sending a repair team up to refurbish the 16-year-old telescope was too risky, scientists the world around were dismayed.

O’Keefe’s decision came on the heels of the Columbia Shuttle tragedy. Now, with a new face at its helm, Michael Griffin and three incident-free shuttle



*Hubble’s Deep Field Image focused on a speck of sky no larger than a dime held up at a distance of 75 feet. The 10-day exposure netted a total of 1,500 galaxies at various stages of evolution. Photo from NASA archives.*

launches under its belt, NASA has reversed its previous decision.

Key to this reversal is the fact that shuttle crews now have vastly improved capabilities to inspect and repair any minor damage that may have occurred during the shuttle’s launch. Columbia’s crash was the result of a chunk of insulating foam from the fuel pod breaking loose and damaging the leading edge of the shuttle’s wing during launch. The damage was close enough to the shuttle’s fuselage, that the crew couldn’t see it from inside. On re-entering Earth’s atmosphere, air friction acted like a cutting torch, causing the damaged wing to shear off the craft and send it tumbling wildly through the atmosphere, eventually shredding it into thousands of chunks. It was a chilling sight that I will never forget. But now it is time to move onward and upward.

In addition to thousands of stunning photographs, that have helped popularize astronomy, the Hubble Space Telescope’s cameras and scientific tools have added immensely to humankind’s knowledge of our roots in the Universe.

Among its many contributions to science, the HST has enabled direct

observation of the universe as it was 12 billion years ago. Via its deep-field photographs, scientists have not only traveled back in time to the near beginnings of the Universe, but to its very edge. This has allowed them to study how the earliest galaxies formed.

Hubble also discovered evidence of black holes at the center of many galaxies.

Plus it has provided measurements that helped establish the size and age of our rapidly expanding universe.

The rehab mission will up-grade HST’s cameras, replace its batteries, and extend the telescope’s usable life up to the year 2013 – perhaps beyond. Without it, the instrument that has captured some of the most spectacular images of the universe would likely deteriorate in 2009 or 2010. Estimated launch date for the mission will be 2008.

Until we meet again in the backyard, keep your house lights down and the stars up big and bright. You’ll save money, energy, and the beautiful Kawartha night skies.

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## Astronomy Christmas Gifts

Tempting though it may be to buy your spouse, friend, child or grandchild a telescope because they think it would be “neat” to do a little stargazing, please don’t do it.

These aren’t the words you’d expect from an astronomy buff, but unless your gift recipient knows the night sky, he or she won’t be able to find anything with a telescope.

Sure they can find the Moon, but what about the planets and beyond? Only when someone knows their way around the night sky, will they know where to point a telescope to find the cool stuff. So opt for an astronomy guide that’ll get them started.

*NightSky* by Terrence Dickinson is a favourite of mine. Sue French’s *Celestial Sampler* is a new and terrific choice. To connect the starry dots, try *The Constellations, A New Way to See Them* by H.A. Rey.

Any of the above books will help your fledgling Albert or Alberta Einstein find their way around the night sky. But what if they want an even closer look at things?



Choose a good astronomy book over a bad telescope and you’ve made a very wise gift decision. You’re also helping the gift recipient because a cheap telescope (almost anything under \$300) is a hurdle not a help – especially when they have no idea of where to point it.

Binoculars are excellent tools for learning the night sky when used in conjunction with a good astronomy book and star chart. The book “*Binocular Highlights*,” available at ([shop@sky.com](mailto:shop@sky.com)) shows how to find 99 objects – nebulae, galaxies, star clusters, Jupiter’s moons, and more. Seven-power binoculars with a 50 mm aperture (7X50) are recommended. Move up to 10-power and you’ll need binoculars that can be tripod mounted because the image will jiggle.

Where can Santa find this astro-stuff? Canal Book Store in Bobcaygeon, Lakefield’s HappenStance, and any Chapters will stock some, if not all of them.

For binoculars as well as books and more, try:

EfstonScience ([www.telescopes.ca](http://www.telescopes.ca)),

Kendrick Astro Instruments ([www.kendrickastro.com](http://www.kendrickastro.com)),

Orion Telescopes and Binoculars at ([www.OrionTelescopes.com](http://www.OrionTelescopes.com)), or

Focus Scientific at ([www.focusscientific.com](http://www.focusscientific.com))

There’s plenty of helpful information on their websites and Orion provides an astro-gear primer that’s great.

So rather than invest in a cheap telescope (more on them next week) plant a few dollars in one of the books mentioned. If your beginner sprouts a greater interest – then nurture that growth with binoculars.

Canada’s closets are filled with Christmas calamity-scopes whose owners lost interest because they couldn’t find the neat stuff pictured on the box it came in. You can’t buy astronomy. You have to learn it – and that can be a lot of fun, honest!

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## NASA Space Place

### Staggering Distance

Tonight, when the sun sets and the twilight fades to black, go outside and look southwest. There’s mighty Jupiter, gleaming brightly. It looks so nearby, yet Jupiter is 830 million km away. Light from the sun takes 43 minutes to reach the giant planet, and for Earth’s fastest spaceship, New Horizons, it’s a trip of 13 months.

That’s nothing.

Not far to the left of Jupiter is Pluto. Oh, you won’t be able to see it. Tiny Pluto is almost 5 billion km away. Sunlight takes more than 4 hours to get there, and New Horizons 9 years. From Pluto, the sun is merely the brightest star in a cold, jet-black sky.

That’s nothing.

A smidgen to the right of Pluto, among the stars of the constellation Ophiuchus, is Voyager 1. Launched from Florida 29 years ago, the spacecraft is a staggering 15 billion km away. It has traveled beyond all the known planets, beyond the warmth of the sun, almost beyond the edge of the solar system itself.

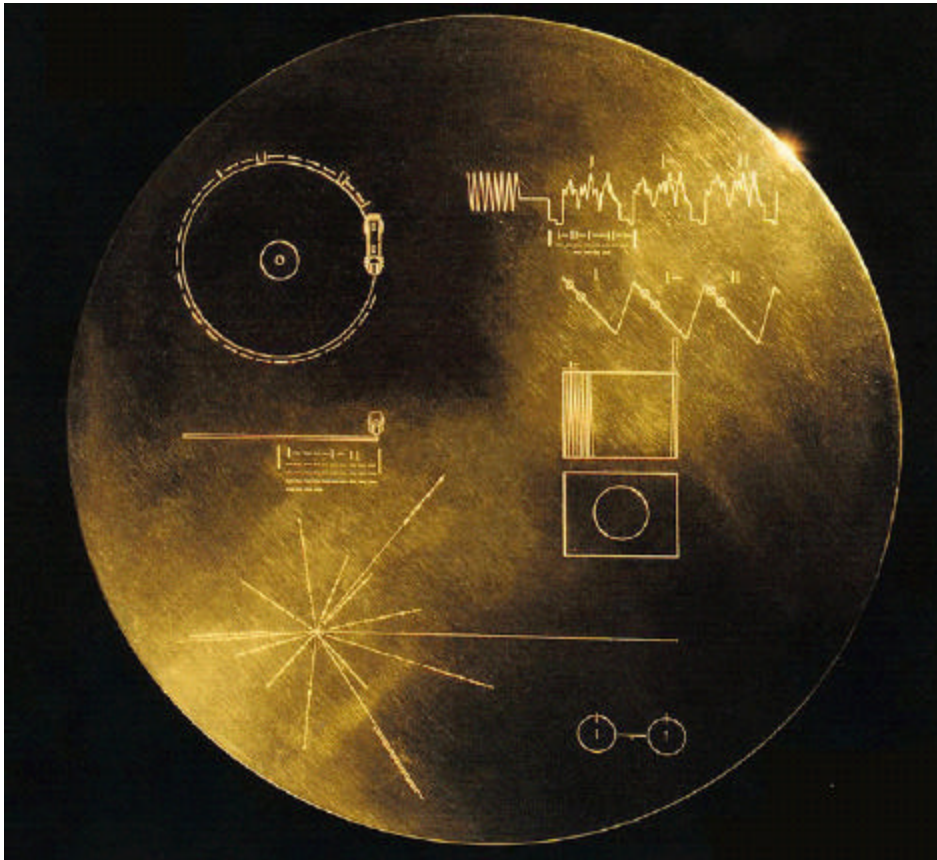
Now that’s something.

“On August 15, 2006, Voyager 1 reached the 100 AU mark—in other words, it is 100 times farther from the Sun than Earth,” says Ed Stone, Voyager project scientist and the former director of NASA’s Jet Propulsion Laboratory. “This is an important milestone in our exploration of the Solar System. No other spacecraft has gone so far.”

At 100 AU (astronomical units), Voyager 1 is in a strange realm called “the heliosheath.”

As Stone explains, our entire solar system—planets and all—sits inside a

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*In case it is ever found by intelligent beings elsewhere in the galaxy, Voyager carries a recording of images and sounds of Earth and its inhabitants. The diagrams on the cover of the recording symbolize Earth's location in the galaxy and how to play the record.*

giant bubble of gas called the heliosphere. The sun is responsible; it blows the bubble by means of the solar wind. Voyager 1 has traveled all the way from the bubble's heart to its outer edge, a gassy membrane dividing the solar system from interstellar space. This "membrane" is the heliosheath.

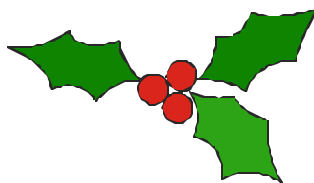
Before Voyager 1 reached its present location, researchers had calculated what the heliosheath might be like. "Many of our predictions were wrong," says Stone. In situ, Voyager 1 has encountered unexpected magnetic anomalies and a surprising increase in low-energy cosmic rays, among other things. It's all very strange—"and we're not even out of the Solar System yet."

To report new developments, Voyager radios Earth almost every day. At the speed of light, the messages take 14 hours to arrive. Says Stone, "it's worth the wait."

Keep up with the Voyager mission at [voyager.jpl.nasa.gov](http://voyager.jpl.nasa.gov). To learn the language of Voyager's messages, kids (of all ages) can check out [spaceplace.nasa.gov/en/kids/vgr\\_fact1.shtml](http://spaceplace.nasa.gov/en/kids/vgr_fact1.shtml).

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

By Dr. Tony Phillips



## So You Still Think Mt. Palomar Has A Big Telescope?

With its 200-inch (5.1 meter) mirror, the Hale Telescope on Mt. Palomar shouldn't have aperture envy. But it is far from the largest telescope currently in service. That honor goes to the telescopes Keck I and Keck II.

These giants live 14,000 feet up atop Mauna Kea on the big island of Hawaii. They are identical twins. Both have 10-meter mirrors. That's about double the size of Mt. Palomar's Hale telescope. Plus the Keck twins have segmented mirrors with adaptive optics systems that help cancel out the blurring effect of Earth's atmosphere. But what's even more exciting is the fact that the brothers Keck can work together as an interferometer with a combined aperture of 20 meters. The twins have already been able to reveal surface detail on Jupiter's moon Io.

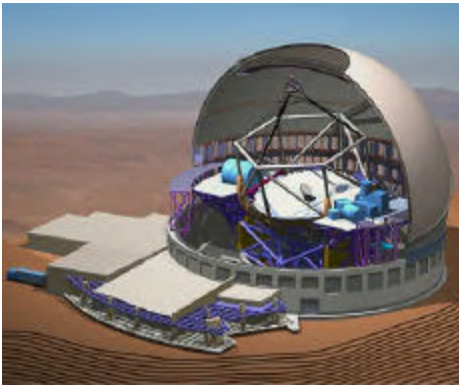
The Keck telescopes went into service in the 1990's and are still the largest fully operational telescopes on Earth. Hubble, with its 2.4 meter mirror is downright puny by comparison, despite its numerous contributions to science. But there's a new kid on the block, and it's going to kick Keck.

Called the Gran Telescopio Canarias (GTC) this big fellow will sport a 10.4 meter mirror. Residing in the Canary Islands off the coast of Africa, the GTC is expected to see first light early in 2007. Unfortunately, the new "Mr. Big" won't be for long.

Within a few weeks the European Space Agency (ESA) will present plans for a 42-meter scope. Called the European Extremely Large Telescope, the E-ELT is on the fast track with a budget of about one billion Euros. But the E-ELT is just the beginning.

Due to be completed in 2014 is a 30-meter giant that will live in the

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*The Association of Canadian Universities for Research in Astronomy is one of the sponsors of the 30-meter telescope currently in development.*

mountains of Northern Mexico, Chile, or high up on Mauna Kea in Hawaii. This scope will be comprised of 738 hexagonal mirror segments, each measuring 1.2 meters across. For a sneak peak at this little tusker, visit [www.tmt.org](http://www.tmt.org).

Not to be out done is the Japanese Extremely Large Telescope. The JELT will have a 30-meter segmented mirror with adaptive optics. Look for it to come online in 2015. For a look at it now, click up <http://optik2.mtk.nao.ac.jp/futureplan/eltproje.htm>

What's the point of bigger telescopes? The more light a telescope can gather, the more detail it can resolve and the greater the magnification it can handle. I have seen examples of how a 30-meter telescope with adaptive optics will be able to resolve details on blurry little galaxies in the Hubble Extreme Deep Field photograph and it is stunning.

Future telescopes will be capable of resolving surface detail on planets orbiting other stars. Moving into the infrared spectrum, they will be capable of seeing galaxies so distant that are invisible in ordinary light.

There's a lot to look forward to. With the new generation of extremely large telescopes, we'll all become space travelers, in the comfort of our Lazy Boys.

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## Comet Swan (C/2006 M4)

This past month in Southern Ontario has not been the greatest for nighttime views, so trying to view Comet Swan has been trying. October 30<sup>th</sup> was an exception. I knew this new comet was low in the northwestern sky and heading to the constellation of Hercules, but to get a clear night and to find it was still there was a real bonus. The evening was not ideal, due to a light polluted sky from my location south of Peterborough, Ontario and a moon that was just past the first quarter, but I decided to try and record what I saw. I mounted my Canon Ftb piggy back on my Meade ETX-90 and loaded with 800 ASA print film, I recorded images with 2 to 3 minute exposures. Using a 135mm lense I was just able to fit the "keystone" of Hercules in the frame.

This image below not only shows Comet Swan in the lower left of the frame (next to Epsilon Herculis, mag. 3.9), but M13 (mag. 5.0) is quite visible to the upper right. You can sure see why Messier (or anyone else for that

matter) would confuse this globular cluster for a comet. In this case, Comet Swan is about the same magnitude and diameter in the eyepiece as the famous cluster of M13. However, Comet Swan having just reached its closest approach to earth on October 26<sup>th</sup> at 1 Astronomical Unit (distance from the sun to the earth) is a lot closer than M13 is at 23,000 light-years away, yet they appear to be similar in magnitude.

Comet Swan does not exhibit its long filamentous tail in this image (nor was it visible in my eyepiece), but the green glow sets it apart from the whiter colour of the stars, including M13's 300,000 star cluster. Not a perfect night, but better than we have had for sometime and well worth the wait.

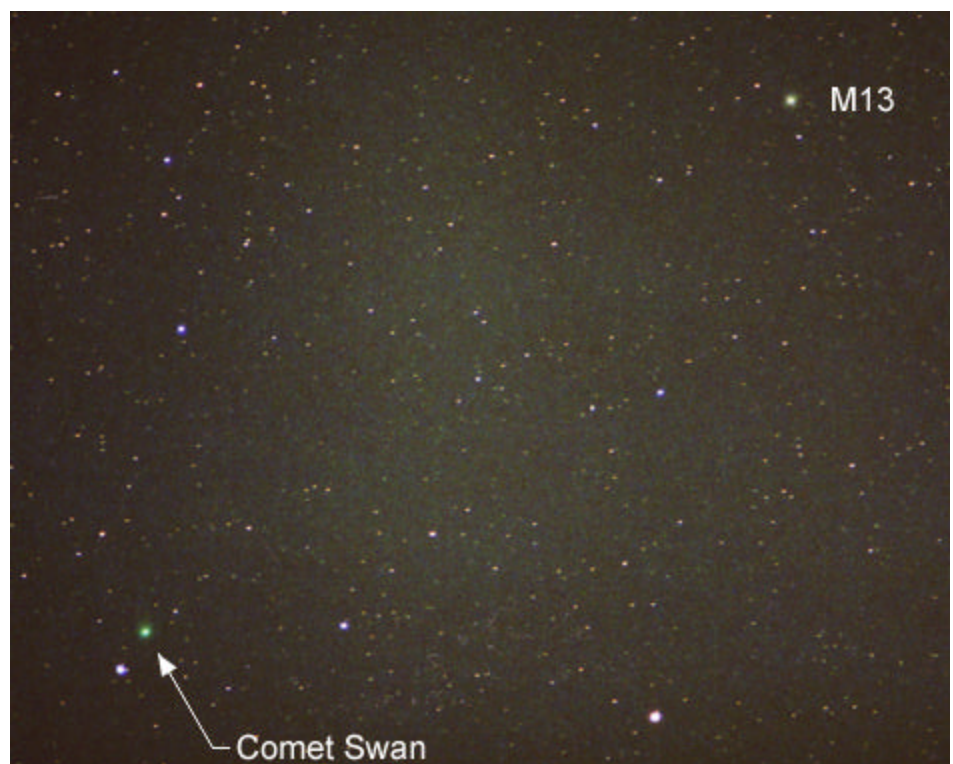
Web links:

<http://www.spaceweather.com/index.cgi>  
(Archive - Oct.30/06)

<http://www.aerith.net/comet/catalog/2006M4/2006M4.html> - Comet Swan Site

<http://seds.lpl.arizona.edu/messier/m/m013.html> - M13

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## Only A Grouchy Green Grinch Would Buy Someone A Christmas Telescope

At this time of year you'll often find me on my knees. I'm not making a secret pact with Santa. Instead I'm pleading with people not to buy a Christmas telescope for someone who is an absolute astronomy beginner. He or she will be totally lost under the night sky. Instead gift them with an astronomy book, star charts, binoculars, maybe a red flash light to preserve night vision...anything but a telescope. Here's why.

Let's say you buy your gift scope from a big box store. Chances are the person who sells it to you won't know zip about telescopes. So if you have a question, don't ask.

If you buy one of the fancy one's with a German Equatorial Mount (they have counterweights) you'll probably put it together incorrectly. Almost everyone does. Or once you have it together, you won't know how to align it with Polaris. Don't know what Polaris is? Don't know how to find Polaris? Think that Polaris is the brightest star in the night sky? Then please, don't buy a telescope.

Why is someone who loves astronomy so negative on Christmas telescopes? I could give you hundreds of reasons – like all the frustrated people who bring their poorly-made big-box bozo-scopes to the observatory. Heaven only knows how many hit the yard-sale because their frustrated owners have simply given up. A good telescope isn't cheap. It will set you back at least \$400 new. That's a lot of money to invest in something for someone who may or may not turn out to enjoy it.

But remember, telescopes for stargazing show objects upside down. So they won't be handy at the cottage if astronomy turns out to not be a turn-on.

Another rule of thumb is that if the telescope is of more interest to little

Throckmorton than the pursuit of astronomy, it will probably fall to the wayside as the next wave of "must haves" crowd onto the store shelves next holiday season.

A bad telescope is a hindrance not a help. If it turns the recipient off, chances are they'll feel the same about astronomy. And that's not what you want.

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## Stepping Down, But Not Side-Stepping My Duty



As most of you know this year was my last as President of the PAA. It was a busy and productive three-year stint. My tenure as President came at a time when the club needed rebuilding. I say that with heartfelt thanks and admiration for our previous President, Dave Duffus, who planted the initial seeds, then spent nearly 30 holding the club together. Without Dave there would have been nothing.

During my thousand days the PAA grew in many ways. Membership jumped from under 20 to 53. The PAA Loaner Scope program came into being, as did the PAA Library.

Our public outreach programs such as International Astronomy Day and participation in the Peterborough Regional Science Fair took the club's profile higher in the community. Our club newsletter continued to be one of the finest produced by any astronomy club – including the 3,500-plus member, PHD-laden, RASC Journal.

On the light-pollution abatement front, the PAA won a tough battle with Peterborough City Hall. Our example inspired others to join in the fight against the incredible waste of money and energy that poor lighting design costs taxpayers and our environment. Mark Coady is now in the process of producing a DVD on the subject and the PAA has become a frequently-called-upon source of information on the subject.

I'm very proud of all those accomplishments and the many that helped make them happen. But I'm more concerned that they continue when I leave the helm.

Many of those successes came about because yours truly spent countless hours doing all the little things that need to be looked after. Like pulling together welcome kits for new members. Making sure we had a full schedule of guest speakers and observing events a year in advance. Not to mention planning the meetings so that they were more than just "chat sessions" for our members.

I spent more than a couple of nights making sure the library list was up to date. I missed Terry Dickinson's talk at Trent last year because the club library needed revising, paring down, and a collection of books for local schools needed to be set up.

When the Frank Hancock Award came into being, I missed being able to talk to the winner or see her exhibit because Mark and I were busy showing students sunspots through our telescopes. Later, I made sure that Mrs. Hancock had a ride to the award ceremonies. It was wonderful sitting on the stage with Jean as Frank's memory was honored and his award was presented. Even more

*Continued...*



wonderful was the cheque for \$1,000 Jean donated to the PAA as we departed Wenjack Theatre. Needless to say, Jean also was given extra copies of The Reflector in which Frank's award was featured.

Before I break an arm patting myself on the back, much of this would not have happened if I didn't have the help of Mark Coady, Susan Coady, Rick Stankiewicz, Rob Fisher, Shawna Miles, and Rene Bowe. Plus there are the unsung heroes – John Cameron, Don and Carol McDonald, Brett Hardy, Colin Cross, Charles Baetsen and Harold Briggs.

I know the club can count on everyone I've mentioned to help continue the PAA as a vital instrument for the promotion and enjoyment of astronomy. But we'll also need participation from you benchwarmers. Otherwise the bright embers of enthusiasm I just named will burn out. They, like me, can't do it all.

You are not subscribers to a magazine who can just settle back for a good read. You are the magazine's writers, art directors, sales people and production people. This club is what you make it. Let things slip, forget the details, drop the ball, and within a few years the PAA will be back to 15 old farts sitting in a room giggling at the same jokes they told last month. If that's what's what you want, it's easy.

Yes, I'm stepping down. But I'm not side-stepping my chores as a member. I will continue to manage the club's loaner scopes, keeping them in good repair and well collimated. I will make certain Buckhorn Observatory continues to make its grounds and facilities available to the PAA for observing nights. And I will continue to help fill the pages of the Reflector with lively articles on our favorite hobby – astronomy.

My best wishes to whoever takes the tiller and steers the ship. You can count on me to be a strong wind in your sails.

John Crossen  
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## The Sky This Month

### MERCURY

Mercury is in the morning sky, very low to the east-southeast. It is accompanied by Jupiter and Mars in the tightest grouping they will have for decades (best on the 9th and 10th). This occurs near the Libra-Scorpius border. Past the second week Mercury is lost in the Sun's glare.

### VENUS

Venus is in the southwest evening sky, but still too close to the Sun and too low to be easily observed.

### MARS

The red planet is difficult to see in the east at dawn, with Jupiter and Mercury.

### JUPITER

Jupiter has risen into the predawn skies, and greatly outshines Mars and Mercury, both of which pass it in the second week of the month. By the end of the month it is raising about an hour before dawn's early light.

### SATURN

Saturn is an easy target near Regulus in Leo, and the only planet visible to the unaided eye in the late evening sky.

### URANUS

Uranus is in Aquarius. This gas giant sets before midnight so look for it in the west after sunset

### NEPTUNE

Neptune is in Capricornus. It sets by mid-evening, making it very difficult to observe this month.

### METEOR SHOWERS:

The Geminids peak on Dec. 14th.

For details, see <http://comets.amsmeteors.org/meteors/calendar.html>.

## Meeting Notes

November 10, 2006

Astronomy DVD's are an important part of the PAA's library and its learning tools for members. Prior to Mark and Susan's A/V acquisition on our behalf we had to lug along a digital projector, a sound system, and a laptop to play DVD's or to present a Power-Point show. In addition to fumbling with a fist full of cables and connections, we also had the dilemma of figuring out which remote ran which piece of gear. No more!

Mark's ever-alert eye for a bargain (honed to perfection at numerous yard sales) spotted this bargain and he scooped it up for us. We had our first opportunity to use it at this meeting and it was a big hit. Easy to set up, the DVD player is built in, as is the audio system. Plus you can also run a Power-Point presentation via your laptop and it comes up on the screen. Our thanks and a big round of applause to the Coady's for their marvelous find. Who knows, we may even pay you for it someday. Just see Rene "rubbercheque" Bowe.

The movie of the night was "Hubble: 15 Years," which took us through the history and the future of the Hubble Space Telescope.

The past few years have brought many new members, and some not so new. Dean Shewring, for example, was a member of the "old days" and has rejoined us since seeing our "wonderful program the PAA had going at the Centennial Museum for International Astronomy Day," as he put it. He has been interested in astronomy for over 40 years and was first introduced to the PAA by

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one of the founders, Harry Adams. Dean was heavily involved in the PAA for about 10 years, taking part in observation classes, trips to the David Dunlop Observatory and the Planetarium -- and editing the first PAA newsletter. Due to some vision problems, he had to take a break, but now we welcome him back.

**November 24, 2006**

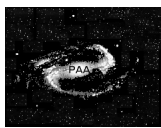
Under a really nice dark sky, several PAA members gathered at Brett Hardy's Cedar Knoll Observatory, in the former Emily Township, for an evening of stargazing. As well as the inviting dark skies, even the light domes of the GTA, noted on our last visit, that hug the southwestern horizon, seemed to be less prominent. The list of attendees included Harold Briggs, John Cameron, Mark Coady, Colin Cross, Rob Fisher, Don MacDonald, Rick Stankiewicz, and Boyd Wood.

It's funny how November is known to be one of the the cloudiest months of the year, yet we have had more clear nights this month than we have had throughout August, September, and October.

Brett's 7 inch TMB refractor provided some stunning visual sights while his 4 inch guidescope, hooked to his Malin-



# Have a Very Merry Christmas!



**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.

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cam and guided by Starry Night software, provided awesome views of M27, M57, and other objects, on a monitor in the observatory.

Outside the observatory, Colin had his 10 inch Dob and Mark had a 70mm short tube refractor set up. Harold Briggs had a rather nice, and quite expensive, set of Canon binoculars, with an image stabilizer, trained on the heavens, as well - with all of us looking at sights like M81, M82, and the Orion Nebula. Despite being on the outside of the observatory, we could still peek in, through the opening, and view what was on the monitor, with ease.

Mark Coady  
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What did the short alien say when he tried to climb back into his spaceship? "Take me to your ladder!"

And what did the thirsty alien say when he landed? "Take me to your litre."



What did the hungry alien say when he landed? "Take me to yourarder."

What did the alien police woman say when she landed? "Take me to your looter."



## ARTICLES

**S**ubmissions 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:

 Shawna Miles  
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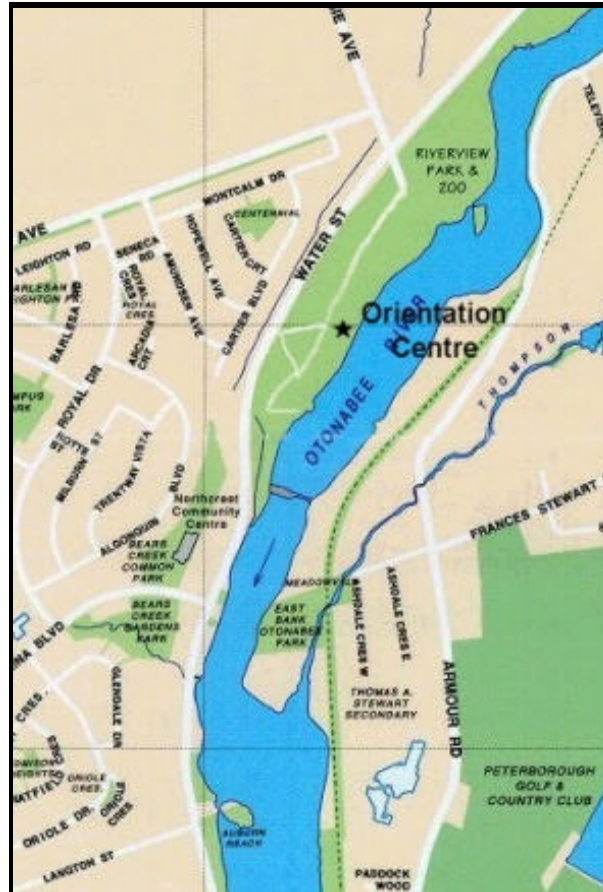
or via e-mail at:  
[Shawna.mi@sympatico.ca](mailto:Shawna.mi@sympatico.ca)

**Please contact me first if you are sending a large file.**

**NEXT ISSUE'S  
DEADLINE IS  
Dec. 15, 2006**  
⌘

## 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**.



## 1 CALENDAR OF EVENTS 1

December 8, 2006

General Meeting— PAA Christmas Cookie Crunch - Riverside Zoo

Meetings for 2007 To Be Announced

## 1 Moon Phases 1

Full Moon



December 5, 2006

January 3, 2007

Last Quarter



December 12, 2006

January 11, 2007

New Moon



December 20, 2006

January 18, 2007

First Quarter



December 27, 2006

January 25, 2007