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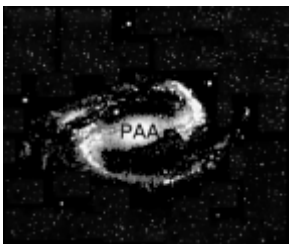
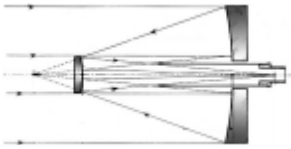


PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR



Volume 4, Issue 1 January 2005

Editorial

Happy New Year to all of our members and may it be blessed with many clear nights! With any luck, this year will be better than last. Over all, 2004 appeared to be one of the poorer years in terms of observing. There were three reasonably bright comets last spring, but due to the rotten weather; most observers in this part of the world did not catch even a glimpse of them. Unfortunately the same thing appears to be happening for Comet Machholz as well. To date, we had only a few clear sky opportunities to view it. As I write this editorial, the skies are still overcast, and if they don't clear off in the next few days, this too will be a write-off.

This month marks the beginning of a new membership year. To that end, I'd like to remind everyone, to pay our Treasurer, Rene Bowes sometime this month. Individual memberships are $30.00. If more than one member of your family is interested in astronomy, you might want to consider a Family Membership at $40.00. Student memberships run at $10.00/year.

Already we have a great line up of speakers and events for the first half of the year. Our first meeting of the year (Jan 7th) will feature guest speaker Ian Wheelband with a presentation on dealing with the problem of light pollution. If you love this hobby, you won't want to miss this presentation. Ian's Club, the Durham Astronomical Association, has been very successful in getting local politicians to set policy with regard to sensible lighting standards. Already, many lights in Clarington and Oshawa are now full cut-off type. A success stories like this, means that there is no reason we cannot do the same in our own backyard.

This year we hope to spend more time observing and bringing our hobby to the general public. Here, Brett Hardy and Don McDonald were showing interested kids and adults sunspots through their telescopes at the Canada Day Celebration in Buckhorn last year.

On January 27th, we will be holding our "Annual Meeting", where we will discuss the events of the last year and put forward proposals for events we would like to do this year. Be sure to attend, as this is a good opportunity to add your "two cents worth".

This year we are planning a bigger and better Astronomy Day event at Armour Hill. With the PAA planetarium and the help of Peter McMahon of the Discovery Channel, this should be our best Astronomy Day yet!

Be sure to book off August 4-7th this year, as Dave Duffus will be putting together a group trip to Stellafane, in Vermont. As you may know, Stellafane is the grand-daddy of star parties. Primarily a telescope making convention, this star party also has reasonably dark skies (when clear). If you are making a telescope, or have done so in the past, be sure to bring it along. This convention also has a large swap table, so if you are looking for odds and ends, this would be a place to check out.

Clear Skies,

Charles W. Baetsen
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Inside This Issue

Meeting Notes

Dec 10 Meeting:

The gathering at Don MacDonalds was cancelled, so we met at the usual spot, however, the meeting was sparse on attendance thanks to the weather. Dave Duffus, Charles Baetsen, Colin Cross, Boyd Wood and John Crossen all braved the elements to make the meeting. We reviewed the Winter/Spring Schedule. With the exception of June, all of the speaker spots are filled, and the observing sites have been split up between Armour Hill, Don MacDonald's and Buckhorn Observatory.

Dave Duffus raised the possibility of a trip to Stellafane the first week in August. Stellafane is the Great Grand Daddy of all star parties with the focus on telescope building. First held in 1926 and attended by about 20 people, Stellafane has now grown to about 2,000 attendees. The annual gathering is held near Springfield Vermont. Interest around the table was high. We will table the proposition again on January 7th, our first meeting of 2005. With any luck the weather will be better and we can gather more input.

Also mentioned was the possibility of making a return trip to the Trinity College Observatory, Haliburton Forest Observatory, the Holleford Meteor Impact site and the Toronto Science Centre's planetarium. Again, we'll table these possible club outings at our next meeting.

With so few people in attendance we decided to forego the DVD and just shoot the breeze. Comet Machholz was one of many topics tossed about. As of yet it hasn't sprouted a tail, but it is definitely quite visible. Colin and Dave brought in their photographs of last month's aurora. Colin's shots were amazingly good considering the fact that he took them all with a hand-held camera using film – not digital!

Boyd brought back the laser collimator, and John Crossen will be using it over the holidays to get the club's new 6" reflector up and running. It should make its first appearance at the January 7th meeting. Charles Baetsen also mentioned that his wife Patricia's grade 6 class was interested in having the PAA do a presentation using the new inflatable planetarium sometime in the new year. John Crossen will be testing it out over the holidays to make sure all systems are 'go'. It has already been booked via Buckhorn Observatory for a 3-day presentation at one of Peterborough's private schools.

Aside from griping about the weather, taxes and having to work for a living, that was about it for the meeting. And so ended the 2004 PAA year. Counting our latest family membership, we have grown to just over 40 members this year. And we are looking forward to continued growth in the new year.

John Crossen
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President's Message—What's up for 2005.

The New Year promises to be a good one for the PAA. From my point of view, there are a number of reasons.

Our membership continues to grow. Since our Astronomy Day presentation last April, our roster has welcomed 15 new names. Roughly speaking that means that one in every three of our members is new. Plus we have two more new members who will sign on in the New Year. And far more important than the membership's growing numbers is the fact that some of our new members have already become active participants in club activities.

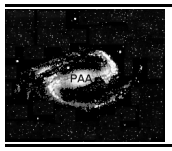
Speaking of activities, we are launching a new facet of the PAA in the New Year. Mark Coady is heading up our Light Pollution Awareness Committee and our first meeting of the year will feature guest speaker Ian Wheelband with a presentation on dealing with the ever-increasing problem of light pollution. If you love this hobby, you won't want to miss this presentation. That'll be January 7th. So mark the date.

Between now and the summer we have a great deal of excitement to look forward to. In addition to Ian Wheelband, we will have presentations from John Crossen, Mark Coady, and Richard Matthews with part II of his superb satellite presentation. Plus we're still working on Graham Wilson – the meteor man – and Doug Angle with a talk about building the Kingston RASC Chapter's 24-inch telescope.

Astronomy day will be even better than last year thanks to participation by Peter McMahon of the Discovery Chapter, the PAA Planetarium, and author Dan Bortolotti's updated talk on the Cassini Mission's latest discoveries, including the Huygen's probe findings.

Dave Duffus will be putting together a group trip to Stellafane, and we'll be doing even more with Emily Park and Centennial Museum to promote astronomy with the public.

At this writing, the second PAA 6-inch loaner scope is just awaiting its base and it will be up and available. The scope



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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saw first light over the holidays, though it only consisted of a view across the road.

The fan for the PAA/BHO Planetarium has been repaired. Today it was put to the big test of inflating the planetarium. It worked very smoothly, moving enough air to keep the 16- X 12- foot dome inflated – even at low speed.

There are more three new books coming to the PAA library. Our video segment will be adding new titles. We now have DVD editions of many of our current selections. And I should mention that we also have four new DVD titles arriving shortly, plus the club has its own version of Starry Night, the computer astronomy program.

Put all that together with our new mentoring program for beginners and 2005 is going to be an exciting year for everyone in the PAA. To all of you, thanks for helping make last year a milestone of growth on every front. Best wishes to all, and clear skies forever!

John Crossen
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Astronomy in Philately

With the focus these days on Saturn, I looked for the one of the best philatelic examples of an image showing the ringed gas giant of our solar system. The superb specimen that I found was one issued in 1999 by the Britain's Royal Mail. The stamp shows an image taken by the Hubble Space Telescope and was part of a four stamp set entitled the "Scientists' Tale". This set was issued on August 9, 1999, in time for the Millennium.

The stamps in this set showed images to represent the "Decoding of DNA", "Darwin's Theory", "Faraday's Electricity" and "Sir Isaac Newton". They choose the now famous false-colour image of Saturn, taken by the Hubble Telescope on January 4, 1998 for the "Newton" image. According to the material released with the stamp set by the Royal Mail:

Great Britain issued this first day cover entitled "Scientists' Tale" on August 9, 1999, as part of a Millennium series. It features stamps commemorating "Decoding of DNA", "Darwin's Theory", "Faraday's Electricity" and "Sir

"Isaac Newton (1642 – 1727) is the person most responsible for the way we think of the nature of the universe today – the physical laws that determine the way our Earth moves around the Sun and the positions of the other heavenly bodies – and, incidentally, why apples fall to the ground."

With the Cassini spacecraft and Huygens probe working their magic there will be lots of reasons to be following the progress of this bright planet across our evening skies this season. By the time you read this article, maybe you will have already seen pictures of the surface of Titan (Saturn's largest moon)? Let's hope.

The Stamp commemorating Sir Isaac Newton, shows a Hubble photograph of Saturn. Newton's Theory of Gravitation, eventually made it possible to launch the Hubble Space Telescope satellite.

Keep looking up.

Your Astronomical Philatelist
Rick Stankiewicz
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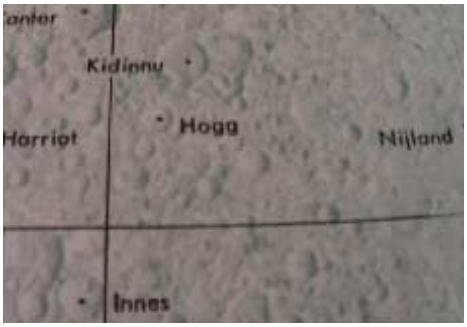
There's a Canadian on the Moon

Actually, there are a bunch of Canadians on the Moon. But to get the story started let's start with one. He – or at least his crater – is on the far side of the Moon. His name is Frank Scott Hogg. And to be honest, I had completely forgotten about the crater named in honour until I began spinning the Moon globe Santa brought me for Christmas.

After visiting the familiar craters, maria and mountain ranges on the near side of our gravitational prisoner, I started looking at some of the features on the backside of the Moon. And there it was – crater Hogg.



The location of Crater Hogg. Named after Frank Scott Hogg, husband of the more famous Helen Sawyer Hogg.

Dr. Hogg was born in 1904 in Preston, Ontario. He was the first student to earn a Doctorate in astronomy from Harvard University. He married Helen Sawyer Hogg and they later moved to Victoria to work at the Dominion Observatory.

Later the two moved to Toronto where he became a member of the U of T astronomy department. He then moved up to head the department and became director of the David Dunlap Observatory. Frank Hogg also wrote a weekly astronomy column for the Toronto Star from 1941 until his death in 1951.

Helen Sawyer Hogg carried on in astronomy to earn renown for studying variable stars within globular star clusters. She also took over writing Frank's original column in the Toronto Star. Helen Hogg became a well-known astronomy popularizer, in addition to her duties at the D.D.O. and as a professor of astronomy at the U of T. Helen Sawyer Hogg was honoured posthumously when an asteroid was named in her honour.

Well, all this piqued my curiosity. How many other Canadians are on the Moon – at least in name? It turns out there are seven more who have been honoured with their own craters.

Anyone familiar with the RASC will know the name Clarence Chant, but there are some others not so well known. The are: Reginald Aldworth Daly, John S. Foster, Andrew McKellar, Simon Newcomb (CDN/US) Robert M. Petrie and John S. Plaskett.

So next time someone mentions the man in the moon, make that men, eh?

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Discovery of the Planets #3

Neptune

The newly found planet (Uranus) had a slight variation in its orbit, almost as if something were tugging at it. Could there be another planet affecting Uranus? A century earlier, Isaac Newton had come up with laws describing the effects that the gravitational forces of planets have on one another. Using Newton's laws, two young scientists set out independently in 1840 to find the unknown planet whose gravitational forces might be pulling on Uranus. One of the scientists was a French mathematician, Jean Leverrier. The other was an English astronomer, John Couch Adams. Both hoped the unknown planet would be where their calculations said they could find it.

Adams finished his calculations first, in September 1845. The following August, Leverrier completed his. Neither had access to a large telescope, so they couldn't verify their projections – and no one would make one available to them. Finally, Leverrier traveled to the Berlin Observatory in Germany, and the young assistant manager, Johann Gottfried Galle, agreed to help search for the planet.

That was September 23, 1846. That night, Galle looked through the telescope, calling out stars and their positions while student astronomer, Heinrich Louis d'Arrest, looked at a star chart, searching for the stars Galle described. Finally Galle called out an eighth-magnitude star that d'Arrest couldn't locate on the charts. They had found the unknown planet! It had taken two years of research – but only a half hour at the telescope. The honour of the discovery belongs to both Adams and Leverrier, who had essentially discovered the new planet with just a pen a new set of mathematical laws. The greenish planet was named after Neptune, the god of the sea.

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The Sky This Month

MERCURY

Mercury will be a morning object for the first half of January.

VENUS

Venus is still a brilliant morning object this month, but it is slowly sinking into the twilight in the eastern sky. By mid-March will be become obscured by the glare of the sun.

MARS

Mars is visible in the early morning sky.

JUPITER

Jupiter rises around midnight.

SATURN

Saturn is well placed for observing this month. It transits around midnight and is located 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.

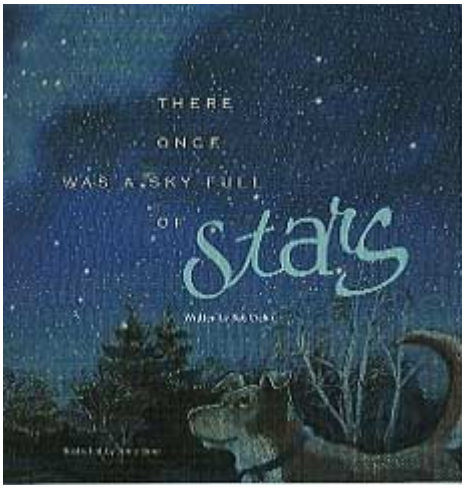
METEOR SHOWERS:

Quadrantids: This meteor shower peaks on **January 3-4**. The radiant is located in Bootes. The shower takes it name from the obsolete constellation *Quadrans Muralis* "The Mural Quadrant", that was located between Bootes and Hercules.

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

There Once Was a Sky Full of Stars

This latest addition to the PAA Library is written for children. The author, Bob Crelin has been active in the battle to preserve our night skies for two decades. He is an artist, musician, inventor and an amateur astronomer. He is also a father, and understands the importance of passing this message on to the younger generation. Early awareness is an important step forward in preserving night skies. Most grown-ups don't even think about dark skies – until they get to the cottage. And if they don't have a cottage, the stars are quickly forgotten. But glaring out the stars by turning night into day also can have a devastating effect on wildlife. And this too, is touched upon in the book. Written in a poetic style with delightful illustrations by Amie Ziner, the book is an excellent tool for teaching kids the value of the night sky for all of nature's creatures. Recommended for children and grandchildren ages 5 – 10 years.



***There Once was a Sky Full of Stars,* is a delightful children's book by Bob Crelin. It is an excellent tool for teaching kids the value of the night sky.**

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A Cheap Red Filtered Flashlight

Every astronomer knows the value of having a red filtered flashlight at their disposal during observing sessions. Not everyone has them because usually you have to order one from an astronomy shop or pay through the nose for an LED flashlight that comes with replaceable red, amber, and blue filters.

NOT ANY MORE! For much less than the cost of one of those "official" night vision flashlights you can outfit an entire club with an effective, yet cheap, alternative.

You will need the following: one small modeler's paintbrush - $1.79 at Home Hardware; one bottle of Testors # 1529 Red MF model paint - also $1.79 at Home Hardware; one used flashlight - sometimes as low as $0.99 (for two!!!) at Value Village. The bottle of paint will last you for treating up to a dozen flashlights.

Take the top off of the flashlight and paint the inside of the lens. Give it about three coats. Let it dry completely. Re-assemble the flashlight and try it out. You might need one more coat of paint. By painting the inside of the lens, you avoid scratching off any of the paint during observing sessions. Disposable flashlights can also be used but with these you will have to paint the outside of the lens as there is no way to get to the inside without breaking the thing.

A red filtered flashlight can be made at a fraction of the cost of a LED unit or a *Mag-Lite*®. Just take cheap flashlight and a bit of red modeling paint and Voila!

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Amateur Astronomers are in for a Status Boost

Not all astronomers work for NASA, a large university, an observatory, or a planetarium. In fact, the men and women who do work in those large astronomical institutions are often too busy to even look through a telescope. So, many have come to rely on dedicated amateurs to do the 'grunt' work.

For instance, most members of the American Association of Variable Star Observers are amateurs who gather data that professionals have come to rely on. Until very recently amateurs could be credited with the discovery most comets. The world of planetary astronomy is also solid ground for amateurs to set up their telescopes on. Amateurs are often the first to spot a dust storm kicking up on Mars or a new mark evolving on Saturn. And there are countless men and women who share their telescopes with others to further public interest in astronomy. They're all called amateurs – a French word derived from *amator* which means

He may be a backyard astronomer, but Gord Rife is doing his bit to promote astronomy through the Huronia Star Party which has brought amateur and professional astronomers together for the past 13 years

'to love'. And love is why they do it, because few, if any, are paid for their efforts. But there was a time when all astronomers were amateurs. After all, you couldn't earn a degree in a science that didn't yet exist.

Nicolaus Copernicus and Johannes Kepler put the foundations of modern astronomy in place – yet they both were only occasional stargazers. Galileo was interested in the science of everything. But when he turned the newly invented telescope toward the night sky, the stars and planets infatuated Galileo.

What else can we credit to amateur astronomers? Edmond Halley was an amateur astronomer who discovered the comet that now bears his name. William Herschel, was a musician and composer by trade. He became interested in astronomy, built a telescope and went on to discover the planet Uranus in 1781. Wilhelm Tempel, a lithographer with little education, is credited with discovering eight comets and the dim nebulosity that surrounds the Pleiades. Percival Lowell of the Lowell Observatory was also an amateur. More recently John Dobson, a one-time Krishna Monk developed the inexpensive, but extremely stable Dobsonian mount that made big telescope astronomy affordable to millions of amateurs.

Now, armed with highly sensitive CCD cameras, computer programs, and the spare time to use them, a vast army of amateur astronomers is exploring the universe. What will they discover? Early this year an amateur astronomer, working with professionals, discovered a new nebula in the constellation Orion. It's called McNeil's Nebula after the amateur who discovered it.

Given the grueling workloads placed on professional astronomers, I can only see the role played by amateurs as being of ever increasing importance.

John Crossen
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John Crossen, our club President, teaches backyard astronomy at Peterborough's Class Connections and owns Buckhorn Observatory (www.buckhornobservatory.com). He is also proud to be called an amateur.

Your Guide to 10 Brightest Stars

No. 5 -Vega:

The name Vega derives from the Arabic word for Swooping Eagle or Vulture. Vega is the luminary of Lyra the Harp, a small but prominent constellation that is home to the Ring Nebula and the star Epsilon Lyrae.

The Ring is a luminous shell of gas that was ejected from an old star. It resembles a smoke ring or doughnut. Epsilon Lyrae appears to the naked eye as a double star, but through a small telescope you can see that the two individual stars are themselves double! Epsilon Lyrae is popularly known as the "double double."

Vega is a hydrogen-burning dwarf star, 54 times more luminous and 1.5 times more massive than the sun. At 25 light-years away, it is relatively close to us. It shines, therefore, with a magnitude of 0.03 in the night sky.

In 1984, a disk of cool gas surrounding Vega was discovered — the first of its kind. The disk extends 70 Earth-sun distances from the star. The discovery was important because a similar disk is theorized to have played an integral role in planet development within our own solar system.

Interestingly, a "hole" was found in the Vega disk, indicating the possibility that planets might have coalesced and formed around the star. It was not by random choice that Carl Sagan selected Vega as the source of radio transmissions received from an advanced alien culture when he wrote the book that was the basis for the movie "Contact."

Together with the bright stars Altair and Deneb, Vega forms the popular Summer Triangle asterism that announces the beginning of summer in the Northern Hemisphere. The asterism crosses the hazy band of the Milky Way, which is split into two near Deneb by a large dust cloud called the Cygnus Rift.

This area of the sky is ideal for sweeping with binoculars of any size in dark-sky conditions.

Vega was the first star to be photographed, on the night of July 16-17, 1850, by photographer J.A. Whipple. With the daguerreotype camera used at the time, he made an exposure of 100 seconds using a 15-inch refractor telescope at Harvard University. Fainter stars (those of 2nd magnitude and dimmer) would not have registered at all given the technology of the time.

Vega used to be the North Star, but 12,000 years of Earth's precession have altered its place in the celestial sphere. Precession is the 26,000-year wobble of Earth's axis due to the gravitational attraction of the sun and moon on Earth's equatorial bulge. In another 14,000 years, Vega will be the North Star once again.

Rick Stankiewicz
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Latest addition to the PAA Library

Man's Conquest of Space. Despite a pompous title that sounds like it should be accompanied by a fanfare, this is an excellent history of man's first steps into space. And it's not just a bunch of NASA good old boys patting each other on the back. Crediting the ancient Greeks with inventing the concept of rocket propulsion – via a steam-powered dove suspended by strings – the book gives credit where it is due. From Archytas of Tarentum, Galileo and Newton to Goddard, Von Braun, and Cosmonaut Yuri Gagarin and Astronaut John Glenn, the book spreads the accolades to those justly deserving. Even Lika the Russian dog and astro-chimps Ham and Billy come in for their share of the glory.

Factual and fascinating in its content, Man's Conquest of Space is also filled with rare photographs not often seen in this sort of archive. Author William R. Shelton has done a masterful job of pulling together the facts and presenting them in an engaging manner that keeps readers eagerly turning the pages. Produce by the National Geographic Society, Man's Conquest of Space makes for an excellent read. Though at just under 200 pages, you may wish it were a bit longer.

Our thanks to Mark Coady for donating this excellent book to the PAA Library.

John Crossen
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There's a Big Dirty Snowball Flying Our Way

Its name is Comet Machholz and it's a real blast from the past. That's 'past' as in about 4 billion years ago.

Comet Machholz is sporting a nice ion tail at this time. Provided we get some clear skies, this comet should be a nice site in binoculars.

Discovered by amateur astronomer Don Machholz in August, the comet that bares his name has also made the tenth notch on is venerable old 6-inch telescope's optical tube.

Comets are left over blobs of ice and dust that originated in the time when our solar system was still forming. Our sun was an unstable ball of hydrogen and helium that had just begun shining via a process called fusion. Fusion uses the titanic pressures at the sun's core to fuse its hydrogen into helium. Some energy escapes during fusion. That's what powers our sun.

The planets were still growing, both in size and number. And the bits of dirt and ice that hadn't coalesced into planets were being gravitationally flung into the outer reaches of our infant solar system. These 'unwanteds' are now called comets. And when their orbits are gravitational perturbed by another comet or the invisible passing of a red or brown dwarf star, they sometimes head inward toward the sun.

Comets usually have highly elliptical orbits that may take them thousands of years to complete. These infrequent celestial visitors are call Long Period Comets. On the other hand, some comets take only a few years to make a full sling around our Sun. Quite logically, they are called Short Period Comets. Haley's Comet visits us once every 68 years, so it falls under the heading of Short Period Comets.

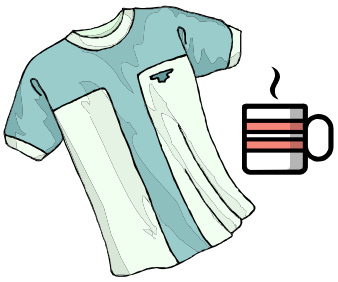
Comet Machholz has yet to sprout much of a tail – at least in binocular view. This doesn't usually happen until the comet comes closer to the sun and begins to melt. As it warms, pockets of gas, water, and dust begin to stream from it like little jets. The jetting streams of cometary debris are pushed back by the radiating force from the sun. Called the solar wind, it causes the debris to form a tail on the comet that always points away from the sun – even when the comet is receding.

So, will Comet Machholz be the next Hale Bopp or Hyakutake? Both those comets were so bright that I could see them from downtown Toronto. It would be great if it did. But current estimates peg it at magnitude 4.1 at its brightest from early January to the middle of the month. But comets are like cats. Both have tails, and they both do whatever they like. We can only wait and see. So in the mean time, keep looking up.

John Crossen
JohnCstargazer@aol.com

COMING SOON:

Official PAA Coffee Mugs* and T-Shirts



$15 each.

E-mail your order to Mark Coady (mark.coady@sympatico.ca) or mail it to:
Mark Coady
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K0L 1H0
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**Coffee Mugs can be personalized with your name at no extra cost.*

PAA's Second 6-Inch Loaner Scope Sees First Light.

Ok, so it was only the trees across the road from our house, but after pulling and pushing the scope together – nothing ever fits – it was a beautiful sight. As soon as the base is complete, I'll point it up towards the stars. No, this is January, so make that clouds.

The optical tube, spider and secondary mirror are from a Russian TAL Scope. The Mirror comes from China. The mirror cell calls America home. And the helical focuser is straight off a Meade Schmidt/Newt circa 1970. It's base will be made from Russian Birch by way of Buckhorn. But as of now, it's all PAA.

This new scope, joins its 6-inch and 60mm brothers as loaner scopes for PAA members who have yet to make the plunge into deep space (and deep pockets) for their own scopes. It's a simple Dobsonian mount design that is compact and lightweight. Plus it's as simple as plastic dog poop to use. The design is also quite rugged, so it can take a few bumps in the night. Also included are two eyepieces and either a 6x30 correct-view 90-degree finder scope or a red-dot finder. I haven't decided yet.

First Light for the second PAA Telescope. This scope is now available to any member to borrow. This is a great way to get started in astronomy.

New members are invited to try the scope out during one of our observing nights. If you like what you see, take it home. Like all our club scopes, it will be on loan until the next member signs on for it. At present we cannot include clear nights with the scopes. But we are working on it.

John Crossen
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Moon Fact #3

The moon is smaller than any planet in the solar system, but relative to the size of the planets they orbit, our moon is the largest of the moons. The moon is 2,160 mi. (3,456 km) in diameter. This is a quarter of the diameter of Earth.

Moon Fact #4

If the Earth was as big as a fist, the moon would be the size of postage stamp…about 10 feet away!

The average temperature range on the Moon is from –283 to +266 degrees F (-139 to +130 degrees C).

Amazing, and Sometimes Amusing – Space

The hobby of astronomy generates some very impressive numbers, not to mention a few brain-boggling concepts. They range from simply incredible all the way to absolutely unfathomable. But then again, with a universe that stretches out for 14 billion light years, we've got plenty of room for big numbers and ideas.

For instance, did you know that Comet Hale Bopp contains enough water to fill one of the Great Lakes? Of course that's nothing compared to the fact that the Orion Nebula contains enough water to completely fill and refill the Earth's oceans every 20 seconds. And speaking of oceans, did you know that the recent earthquake in the Indian Ocean was so strong that astronomers think that it may have caused dear old planet Earth to wobble? Care for some more mind-altering numbers?

If you cut our Sun in half, then hollowed out both halves, you could place the Earth inside it and there would be room enough for the Moon to orbit the Earth without touching the inside walls of the Sun.

That's big. But the red giant star Betelguese is so large that our entire inner solar system could orbit inside of it. That's Mercury, Venus, Earth and Mars. In fact Betelguese is the largest single object that can be seen by the human eye. It's the top left star in the constellation Orion. In Arabic Betelguese means armpit of the warrior. Phew!

How much do little bits add up? After our Moon coalesced following the giant impact that created it, it orbited Earth at a distance of just 16,000 kilometers. Since then the Moon has been moving away from us at the rate of about 3 centimeters per year. Today that little annual nudge adds up to 400,000 kilometers.

The Moon's gravitational tug on the Earth affects more than the tides. When the Earth first formed it spun at a much faster rate. Even during the early dinosaur days – 250 million years ago – our day was only 18 hours long. Since then the Moon's pull on our oceans has caused the Earth to spin more slowly – especially on Friday afternoons. And while we're on the Moon (at least figuratively speaking) it is estimated that our celestial dance partner took over a million meteor hits during the days when

our solar system will forming and filled with debris.

If the entire 4.5 billion year history of our planet were compressed into a 24-hour period starting with Earth's formation at midnight, the human race wouldn't have begun ambling across the globe until about 11:55 the following evening. Bacteria, on the other hand, may have been around for nearly 3.5 billion years – or the early morning hours on our 24-hour clock.

Crazy big numbers and brain-stretching concepts are a couple of the reasons that I find astronomy so fascinating. Then there's the shear beauty of a cloudless, Moonless, sparkling clear night sky. Someone once said that the stars are like friends. Even when you can't see them, you know they are there. And in mid-January in Ontario, that's about all that keeps amateur astronomers going most nights.

John Crossen
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Another "Twist" on Einstein

I read in the Toronto Sun (Oct. 22/2004 p. 60) (I know, not your typical science journal) recently that the Earth is "twisting" the fabric of the space-time continuum, as it rotates in space. Physicists at NASA say they have measurable proof of this aspect of Einstein's, General Theory of Relativity – that a rotating body warps and twists the fabric that combines the three dimensions of space and the fourth dimension of time. They have observed two Earth orbiting satellites and measured the distance from Earth to the satellites with the accuracy of millimeters and found that they did shift as the planet pulled on space.

The "Laser Geodynamics Satellite I (LAGEOS I) and LAGEOS II, are covered with reflectors to make them easy to follow and measure from Earth. Their butterfly-shaped orbits are meant to simulate the movement of a spinning gyroscope. Einstein's theory predicts a nearby spinning body, such as Earth, will pull on space and cause a gyroscope to shift slightly on its axis.
They have attempted to eliminate all of the known forces, like gravity, etc., that could be acting on the satellites. The effect of what is being observed, is like a "spoon twisting in a jar of molasses". (Now that would put Einstein in a sticky situation)
Now there is a new "twist" on an old theory.

Rick Stankiewicz
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Classifieds

Carton 7x50 Binoculars designed for eyeglass wearers. They feature a fast-focus central paddle, individual diopter adjustment, end caps and dew shields. Central nut removes so that they can be mounted on a tripod with adapter. The cost over $200.00 when new. Now they can be yours for **$75.00**.

Rare D&G 5-Inch Apochromatic Refractor is just one of 10 produced by this venerable old company. Focal ratio is F9.5. High costs curtailed production in the early 1990's. Adjustable lens cell features ED glass. 2" focuser and diagonal included along with original wooden carry case. **$3,750** takes it home.

Wooden Tripod Features Equatorial Head and 5-inch Mounting Ring. This well-made setup was originally was home to a Schmidt/Newt. Features manual R.A. and DEC. controls. Needs a counterweight bar. If you have **$25**, I have your next mount.

Not-so-rare **Celestron 80 mm Short Tube Refractor** now available. Includes 1.25" diagonal, red-dot finder and tube rings. It is a great tote-scope, or you can use it as super finder. It will show all the Messier Objects under a dark sky. A measly **$150** makes it yours.

Metal Pedestal Pier for your Newtonian. Originally made by Criterion, this 4-inch diameter pier makes a solid base for Newts up to 8-inches in aperture. The pier legs detach for transportation. Will take most modern mounts with a bit of fiddling. Cleaning out the shop – make me an offer over **$65**. Hey, these things normally go for a couple of hundred.

EQ-5 Tripod and Mount features drive motors on both axis. Operates on 4 D-Cell batteries. Includes mounting bar and counter weights. Sturdy enough for an 8-inch Newt, SCT, or 4-inch F12 Refractor. Yours for just **$350.00**

Contact: John Crossen
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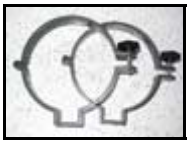
Phone: 705-657-7718



Rings for 4.5" reflector. Pair of telescope rings that fit 4.5" reflector (Synta, Skywatcher, Celestron, Orion etc.) Asking **$25**.

Contact: Charles Baetsen
E-mail: va3ngc@rac.ca
Phone: 905-983-8143

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

NEXT ISSUE'S DEADLINE IS

Feb 1st, 2005

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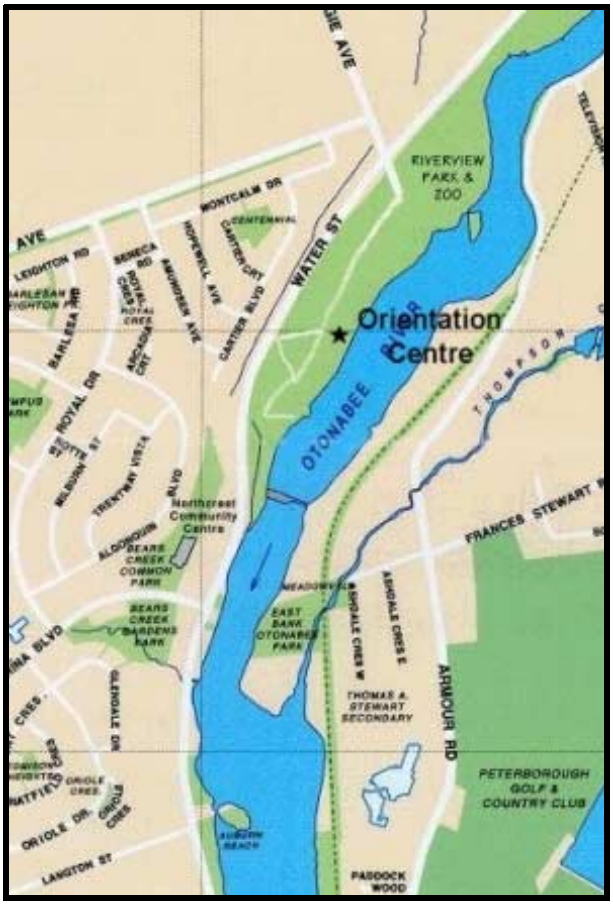
MEETINGS

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

January 7, 2005	**General Meeting** — Ian Wheelband on Light Pollution
January 21, 2005	**Annual Meeting**— Council Reports, Proposals for 2005
February 4, 2005	**General Meeting—**Observing Night at Armour Hill
February 18, 2005	**General Meeting—**Mark Coady on Ham Radio and Astronomy

MOON PHASES

Last Quarter (☾)	**January 3, 2005**	**February 2, 2005**
New Moon (●)	**January 10, 2005**	**February 8, 2005**
First Quarter (☽)	**January 17, 2005**	**February 15, 2005**
Full Moon (○)	**January 25, 2005**	**February 23, 2005**