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PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR

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Editorial

Summer holidays have arrived. This will be the last issue of The Reflector until September. Feel free to keep sending me articles throughout the summer. I'm making the next deadline for articles September 1st, 2007. That way I should be able to get the next issue out in the beginning of the month. The PAA Astronomy Day was a success again this year. I was not able to attend, but some club members wrote an article about it. Check it out inside this issue! Below is a letter from our PAA President:

Astronomy Day Thank You

I wanted to officially thank all those that helped in any way to make Astronomy Day 2007 the success it was. I know that Mark Coady is planning to have an article about the big day in this issue and I do not want to steal any of his thunder. In particular, I would like to thank all those that sold tickets on the telescope draw. We sold all but 3 books. This is truly amazing and it shows what can be done when everyone gets behind a project. This not only allowed us to accomplish our goal of supporting our partner, the PCMA, but also to reach our public outreach objective. Also, a big thanks to all our sponsors and the many members who helped out the day of the event. I am already looking forward to next year.

Rick Stankiewicz, PAA President

Space Shuttle Atlantis preparing for launch. Image credit: NASA

Space Shuttle To Launch This June

The space shuttle Atlantis was scheduled to launch in March, but due to damage to the external fuel tanks caused by a hail storm, it's launch date had been pushed to June 8th, 2007.

Atlantis will take Commander Rick Sturckow and six crewmembers to the International Space Station (ISS), where they will spend 11 days. The crew will work on installing a 17 ton segment on the station's girder-like truss and a new set of solar wings. This mission will increase the station's power capacity and prepare it for the science modules the European and Japanese space agencies are sending up. Atlantis will also bring back astronaut Sunita Williams, who has been aboard the ISS since last December.

For more information go to:
http://www.nasa.gov/shuttle

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Inside This Issue

Announcements:

Light Pollution Guru Now a Published Author

Mark Coady, our Director of Publicity and Light Pollution Abatement, has had an article on light pollution, titled "Reclaiming Our Night Skies: Fighting Light Pollution - which is based on his public outreach presentation to other astronomy clubs, published in the June issue of the Journal of the RASC. A congratulatory e-mail was received by Dr. R. Elizabeth Griffin, of the Dominion Astrophysical Observatory, in Victoria B.C.

Stargazing Scopes Needed

Peter McMahon has a week-long "Summer Space Camp" for kids at the PCMA that will run from Monday August 13th to Friday August 17th. We have been asked by the PCMA to set up scopes for stargazing, weather permitting, on Armour Hill, on the Friday evening. So mark Friday August 17th on your calendars and be prepared to bring your scopes out public viewing.

Peterborough Astronomy Day A Full Blown Success

On Saturday May 26th the PAA held its own version of Astronomy Day at the Peterborough Centennial Museum and Archives - PCMA, on Armour Hill beside the famed Liftlocks, which also happens to be the highest point in Peterborough. We had to settle on this date because of the reluctance of the PCMA's staff to host any outdoor activities in April, despite the fact that April 21st – the actual date of International Astronomy Day - was a sunny and warm day this year.

The daytime activities got off to a tentative and mildly rocky start as the

skies did not want to provide much of a break in the clouds for safe solar viewing. This was not a total loss, however, as there were no sunspots to be viewed. The last major spot had rotated out of view a couple of days before.

The inflatable planetarium was in much demand and well attended. It seemed that our planetarium operator, John Crossen, went the entire day with hardly a break in the action. There were quite a few people who had never been inside a planetarium before and found it fascinating.

The presentations were held in the PCMA's General Electric Fine Portable.

At 2:00 PM our light pollution guru, Mark Coady, did a talk on the topic that was geared to children and based on Bob Crelin's book "There Once Was a Sky Full of Stars". As the children came in, Susan handed each one of them a colourful popsicle-stick decked out with stars that served the dual purpose of being an Astro bookmark they can take home and also be their ticket stub for a draw for some neat stuff. Mark then managed to keep the children spellbound with the excellent pictures and graphics he had assembled. Then we had Bridget Fisk, who had brought Starcruiser 1 from Star 93.3 FM to help publicize the event, draw the winning tickets. One lucky child went home with a copy of the book and another went home with a glow in the dark model of the solar system that also contained an educational CD Rom on the solar system.

The 3:00 PM session was a round table Q&A session on astronomy with Rick Stankiewicz, Robert Fisher, and Mark Coady talking about how they got involved in the hobby and fielding many questions on the topic. From that session we garnered four potential new members who are going to show up at our next meeting.

Fellow member and Discovery Channel wizard, Peter McMahon, then put on a combination indoor/outdoor preview of his weeklong "Summer Astro Camp" that will be held in August. It was a hit with the children as there were games demonstrating solar system mechanics and an interesting demonstration of a comet using a kettle, a small plastic ball, and a flashlight.

For the first time we did not have an actual Light Pollution display. Instead,

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Peter MaMahon giving a preview of his weeklong "Summer Astro Camp" with the kids. The astro camp will be held in August.

Some solar observing with the public.

we had Martin Butorac, President of Ener-Save Lighting Technologies - a distributor of IDA approved lighting, set up a display of responsible lighting. Assisting him was George D'Almedia, VP of Sales and Marketing for Compass Consortium Corporation – one of Martin's suppliers. There was a range of fixtures for the homeowner, business and institutional applications, as well as advances in street lighting. The hit was obviously the LED streetlight fixtures that had just hit the market. In 30, 60, and 90 watt applications they will replace 100, 250, and 400 watt streetlights and last (the fixture and the LEDs) for at least 20 years. The payback period for these fixtures is under two years. The display was exceedingly well attended – much beyond theirs, and my, expectations. And, they may end up making some sales from it as management from a couple of local manufacturing companies, who happened to be there, have requested that they come back and give quotes on replacing indoor and outdoor lighting at their facilities.

Then, after a supper break, we reconvened in the Fine Portable for Peter McMahon's "Celebrity Tour of the Universe". It was a light hearted look at how real astronomy is featured in science fiction.

We then assembled our scopes on the hill. While the sun had not yet gone down, the moon was high and gave us something to show off to the public.

A nice touch this year was an hour long concert between 8:30 and 9:30 PM by the Charlie Glasspool trio. Charlie is a local musician who has composed music with astronomy as its theme. The instruments were a couple of synthesizer keyboards, a bass, a small accordion, and a Theremin. You may think that you have never heard a Theremin before. It's haunting, and high pitched, tones are featured in the music of the sci-fi classic "The Day the Earth Stood Still".

By then it had gotten sufficiently dark enough to start training our scopes on objects other than the moon. There were many cries of "Ooh", "Aah", and at least one "Far Out!" as we showed off how Venus' phase was mimicking the first quarter moon and the rings of Saturn in all their splendour.

As I had the job of organizing this day, I had arrived on site just after 10 AM. By 10 PM I started to get tired so I packed up and Susan and I headed home, yet there were still plenty of scopes on display. All in all, it was a full blown success.

This year we had the most participation of PAA members than ever before. It certainly made my job a heck of a lot easier. Thanks to all of you for coming out and helping. Big back pats are due to the following: Susan, for her constant support of my obsession with this hobby; John Crossen for, once again, bringing out the planetarium and giving people a neat view of the night sky in the middle of the afternoon; and last but by no means least, our President, Rick Stankiewicz, for running the draw so effectively and efficiently. By 3:00 PM all tickets that were left over had been sold – leaving many people wishing they had bought them earlier.

The draw for the telescope, and other prizes, was then made with Jane Wild, of the PCMA, drawing the winning tickets.

Astronomy Day Draw Winners 2007

1st Prize – Mary Lynne East (telescope)
2nd Prize – Don Clark (binoculars)
3rd Prize – John Thompson (NightWatch book)
4th Prize – Glen Ingram (astro-calendar)
5th Prize – Diane Skinner (BHO passes)
5th Prize – Steve Hendry (BHO passes)
5th Prize – Jason Anderson (BHO passes)
5th Prize – Al Mack (BHO passes)
6th Prize – Joey Nerad (Saturn book)
7th Prize – Chris Erkstein (Pluto book)
8th Prize – Abby Cameron (SkyNews mag.)
8th Prize – John Webster (SkyNews mag.)
8th Prize – Fred Licence (SkyNews mag.)
8th Prize – John Webster (SkyNews mag.)
8th Prize – Bob Lackey (SkyNews mag.)

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New NASA Observatory Already Has A Colorful History

The year is 1927 and a young pilot named Charles Lindbergh is preparing to make the first solo transatlantic flight in history from New York to Paris. I wasn't around then, but I do remember the 1960's film with Jimmy Stewart in the role of Lindbergh.

Roll the clock ahead fifty years to 1977 and Lindbergh's wife, Ann Morrow

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This is an observatory? You bet – a flying observatory. The imaging telescope was built by the German Aerospace Centre while NASA modified the vintage 747 for taking celestial images at 40 000 feet. It will now undergo 2 years of testing with the first images due in 2009. Photo by NASA, L3 Communications Integrated Systems.

Lindbergh, is now the centre of attention as she dedicates one of the famed Pan American World Airways 747 airliners to the memory of her husband. The plane is a special short-bodied 747SP designed for global duty. In keeping with the Pan Am tradition of naming its planes after the famous Clipper ships, this one is called Clipper Lindbergh. Its first flight traced the same course as its namesake, from New York to Paris.

Eleven years later the plane was purchased by United Airlines, and in 1997 it became the property of NASA, which has now outfitted the plane for carrying a two-meter Infrared observatory. The observatory (officially known as SOFIA for Stratospheric Observatory for Infrared Astronomy) will fly above 40,000 feet which will place it above 99% of our atmosphere's water vapor. Fittingly, the observatory was dedicated by Eric Lindbergh who stated that it is "a fantastic blend of 20th century aircraft technology and a 21st century platform for exploration."

Because the water vapor in Earth's atmosphere greatly degrades the capabilities of imaging and collecting data in the infrared spectrum, working at an altitude which is above 99% of that water vapor will greatly enhance images. Plus if repairs are required you simply land and fix the observatory. That's easier than sending a crew of astronauts into space to service an orbiting satellite. Plus, unlike a satellite that is in a fixed orbit, Clipper Lindbergh and SOFIA can be sent to any location around Earth to gather information of star occultations and other events as they occur.

And while we're wishing NASA's latest observatory a long and happy life (its predicted mission length is 20 years), let's not forget to wish the Hubble Space Telescope a happy 17th birthday. It's hard to believe that the Hubble is now old enough to drive. It seems like only yesterday that I was standing in the showroom of Perceptor (a Schomberg telescope store) watching owner John Kidner downloading images of the Hubble's new improved imaging capabilities. It was phenomenal the difference the repairs had made. I remember the mission led by astronaut Story Musgrave to make the repairs. It was televised in nearly its entirety without commercials. Deb and I were glued to the screen tighter than a 13-year-old watching the finals of American Idol.

But now I'm starting to sound like Grandpa Simpson, so until we meet again in the backyard, keep your lights pointed down and the stars up bright.

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The Hubble Space Telescope Is Old Enough To Drive

Seventeen years ago the Hubble Space Telescope (HST) was placed in orbit around the Earth. It was a heralded as mankind's "giant eye in the sky." There were much larger ground-based telescopes. But they had to peer into space through 20 km of Earth's dense atmosphere that blurs incoming star and planet light. HST does its astronomy from 300 km above Earth's light-blurring atmosphere. What could be better? A lot, as it turned out.

The first photographs from Hubble were no better than the ones taken by its Earth-bound cousins. There had been a glitch in the HST's mirror grinding and it was off by less than the width of a human hair over its 2.4m (94") diameter.

Then somebody came up with a brilliant idea, send a crew of astronauts up with a set of lenses to correct Hubble's vision. To that end, a team of astronauts led by Story Musgrave took HST the lenses needed to correct its vision. No doubt about it, they were the world's most expensive pair of glasses. Happily they worked and that success opened up a vault of knowledge from which the human race is still making hefty withdrawals.

Hubble's improved view of nearby galaxies revealed huge areas within them

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Launched on April 24, 1990, HST is the size of a school bus and orbits Earth at an altitude of almost 600 km every 90 minutes. One more upgrade mission is scheduled, then HST will be de-orbited in 2020.

where millions of new stars were being born. Hubble showed us planetary detail on Mars and Jupiter that we had never seen before. In one of Hubble's most famous photographs, its camera took a 10-day exposure of a speck of sky no bigger than a grain of sand held at arm's length. That photo revealed nearly 5,000 galaxies that were born 13 billion years ago. In other words, HST took us very near the edge of our universe.

Hubble also took us deep within the Orion Nebula and showed us new stars and planetary systems in the process of forming. And in the Eagle Nebula Hubble imaged star birth in the tip of a pillar of dust and gas that was three light years (30 trillion km) tall. The photo was called the Pillars of Creation and is one of HST's most famous.

Hubble also showed us galaxies in the process of colliding and tearing each other apart, new galaxies being born, and planetary detail that helped us choose landing spots for the Pathfinder, Rover and Opportunity missions to Mars.

There have been more hick-ups along the way. Even now Hubble's famous WIFPC2 (wide-field) camera is out of commission and is not likely to be repaired. But despite its first stumble in the starting blocks and a few bumps along the way, Hubble has advanced our knowledge of the universe by an incalculable measure.

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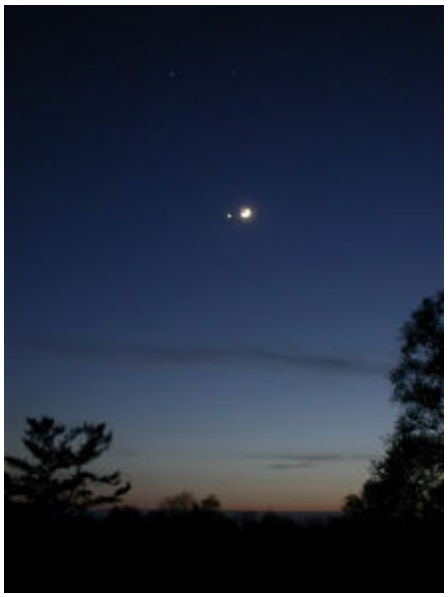
Conjunction Season Is Upon Us!

After writing an article for the last issue of The Reflector, on the beautiful conjunction of Venus and Moon of April 19th (May/07, pg.9) I could not believe my luck in capturing an even more spectacular event on May 19th. Not only was it a clear evening sky, but also the conjunction of the same two celestial bodies was even closer (a mere one degree of separation). It is rare to have



such a close pairing. The disc of a full Moon is about ½ a degree in diameter, so you can see from the image above that Venus is much closer than the April conjunction. Compare the views for yourself. I hope you got a chance to witness this event yourself. It is always such a treat to see the two brightest objects of the night sky hanging close together in the western sky after sunset. Even if you missed the last few conjunctions of Venus with the Moon, the conjunctions don't stop there because the season is upon us. On June 30th Venus and Saturn will be two-thirds of a degree apart on the western sky. That will be close enough to see both planets at the same time in a low power eyepiece of a telescope, now that will be a sight to remember. It promises to be the closest planetary conjunction of the whole year! You don't want to miss this, but I always recommend watching the skies a day either side of such events, just in case you get clouded out on the "big day", at least you might get a nice consolation prize of still seeing these planets almost as close as on the 30th. Close is better than not at all. So, get your camera, binoculars or telescope out and enjoy the season, the conjunctions are upon us.

Keep looking up!

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Attack Of The Tidbits From Outer Space

Sometimes I find that my readings have uncovered an invasion of alien intellect worth sharing. Here's a flying saucer-full of fun from…worlds beyond (echo…echo…echo).

At a recent gathering of the American Astronomical Society in Honolulu, an international team of astronomers announced the largest single discovery of extrasolar planets ever. Extrasolar planets are planets that have been detected orbiting distant stars. This brings the total number of confirmed planets outside our solar system to 236. It is also reported that four of the newfound exoplanets lie within multiplanet systems.

In about a billion years our sun will have expanded to the point that Earth's oceans will have boiled away and living on dear old Terra Firma will be impossible. So we'll move out to the solar suburbs, say Mars. But eventually our expanding sun will toast the red planet, too. Where to next? As the sun reaches the end of its lifespan and becomes a red giant star, some say that those who live on Pluto may find the weather to be much it is today in Florida. We'd have to get used to having three moons, and living in a much smaller (make that crowded) environment. But we'd be living.

The Hubble Space Telescope is still making some fantastic discoveries. In a multiple image mosaic taken of a chunk of sky the width of 3 aspirin placed side by side, the telescope revealed 50,000 distant galaxies. The image goes back in time (or out into our universe) 8 billion light years, a time when our universe was less than half its present age. This latest HST image was taken in a small section of the Big Dipper

The time of year when most people in North America look up at the night sky isn't on August 12, the night of the Perseid Meteor Shower or even during a lunar eclipse. It's on the nights of July 1st

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Martian polar caps are made of carbon-dioxide snow and ice. Scientists have measured the snow depth at 80º north latitude and discovered that is nearly 2-meters deep. Now all we need is a good steep hill. Photo taken by amateur astronomer Damion Peach.

and 4th when Canadians and Americans are attending patriotic fireworks displays. So, as you sit in the bleachers looking skyward and the person next to you comments on the bright object in the western sky, you can tell him or her that it's planet Venus. That should get them to slide over a bit.

The United States and Russia may soon count India and China as co-visitors to the Moon. Both nations are planning moon shots within the next few years. Also under study is the feasibility of using the Moon's gravity to send undetected missiles from the far side of the Moon to shoot down military and communications satellite targets. How come we always pack our bad habits when we go on a trip?

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NASA Space Place

The Ions of Dawn

This summer, NASA will launch a probe bound for two unexplored worlds in our solar system's asteroid belt—giant asteroids Ceres and Vesta. The probe, called Dawn, will orbit first one body and then the other in a never-before-attempted maneuver.

It has never been attempted, in part, because this mission would be virtually impossible with conventional propulsion. "Even if we were just going to go to Vesta, we would need one of the largest rockets that the U.S. has to carry all that propellant," says Marc Rayman, Project System Engineer for Dawn at JPL. Traveling to both worlds in one mission would require an even bigger rocket.

This is a trip that calls for the *un*-conventional. "We're using ion propulsion," says Rayman.

The ion engines for the Dawn spacecraft proved themselves aboard an earlier, experimental mission known as Deep Space 1 (DS1). Because ion propulsion is a relatively new technology that's very different from conventional rockets, it was a perfect candidate for DS1, a part of NASA's New Millennium Program, which flight-tests new technologies so that missions such as Dawn can use those technologies reliably.

"The fact that those same engines are now making the Dawn mission possible shows that New Millennium accomplished what it set out to," Rayman says.

Ion engines work on a principle different from conventional rockets. A normal rocket engine burns a chemical fuel to produce thrust. An ion engine doesn't burn anything; a strong electric field in the engine propels charged atoms such as xenon to very high speed. The thrust produced is tiny—roughly equivalent to the weight of a piece of paper—but over time, it can generate as much speed as a conventional rocket while using only about 1/10 as much propellant.

And Dawn will need lots of propulsion. It must first climb into Vesta's orbit, which is tilted about 7 degrees from the plane of the solar system. After studying Vesta, it will have to escape its gravity and maneuver to insert itself in an orbit around Ceres—the first spacecraft to orbit two distant bodies. Dawn's up-close views of these worlds will help scientists understand the early solar system.

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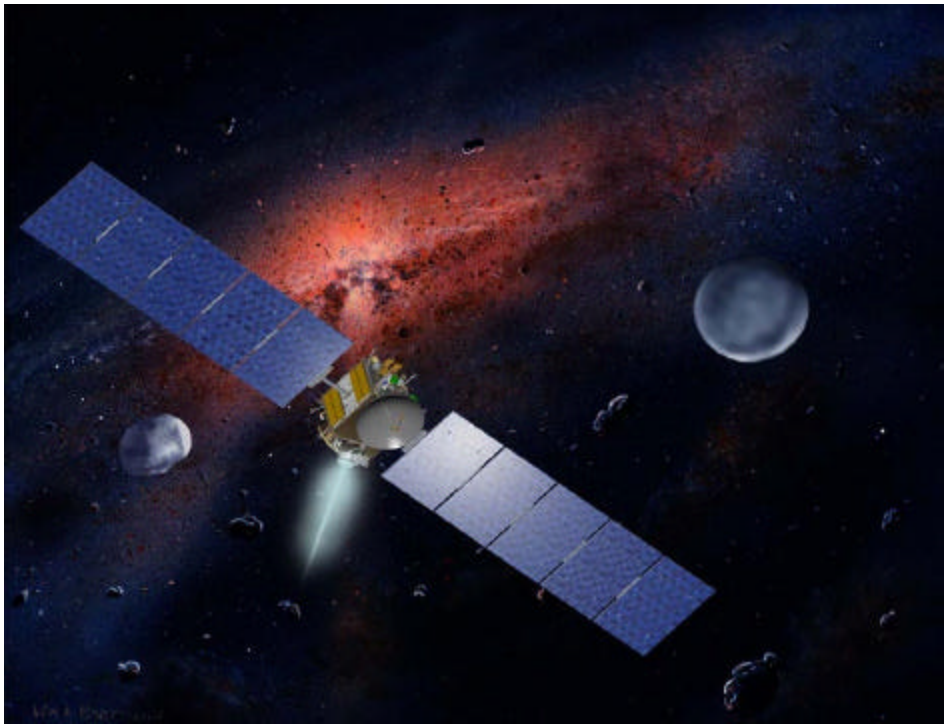

Artist's rendering of Dawn spacecraft, with asteroids. Largest are Vesta and Ceres. Credits: Dawn spacecraft—Orbital Sciences Corporation; background art—William K. Hartmann, courtesy UCLA.

"They're remnants from the time the planets were being formed," Rayman says. "They have preserved a record of the conditions at the dawn of the solar system."

Find out about other New Millennium Program validated technologies and how they are being used in science missions at http://nmp/TECHNOLOGY/infusion.html . While you're there, you can also download "Professor Starr's Dream Trip," a storybook for grown-ups about how ion propulsion enabled a scientist's dream of visiting the asteroids come true. A simpler children's version is available at http://spaceplace.nasa.gov/en/kids/nmp/starr.

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

By: Patrick L. Barry

The Andromeda Galaxy is similar to our Milky Way Galaxy, only about one third larger. Our solar system is traveling at 792,000 km/h as our galaxy rotates it along. Yet it still takes 225 million years to complete one galactic lap. Photo by amateur astronomer, Gord Rife of Schomberg, ON

You'd Better Sit Down Before You Read This

Ok, now that you're settled back and relaxed, let me ask you how fast you're moving. If you think you're not moving, think again and think fast…a lot faster.

The Earth is about 38,000 km around and rotates once every 24 hours. Happily gravity holds you, the water, and our atmosphere tight to dear old terra firma. But if you lived at the equator you are moving at 1,600 km per hour. The speed drops as you move north towards Canada, but you're still maintaining a good clip.

While you're whirling around on our globe at 1,600 km/h, the globe is also orbiting our Sun. It takes 365.25 days to complete the 980 million km journey. To make it back to the starting line in time for the New Year's party you are also whizzing along at 107,000 km/h. You, along with our solar system are also moving towards the star Vega at a speed of 70,000 km/h. Still feel the need for speed? Next up is galactic rotation.

The Milky Way Galaxy is about 100 million light years across. From our position inside the galaxy it takes you, the Sun and our solar system 225 million years to make one complete orbit around the galactic core. That may seem like a snail's pace, but the truth is you're whistling along at 792,000 km/h. That's brisk, even at that speed you'd have to live for 225 million years to make one lap. Maybe you'd better pack a lunch.

Timothy Ferris once said that if you think of our galaxy as being the face of a clock and the second hand as marking the spot where the Sun was when mankind first stood up and walked, the second hand would have moved just ½ a click. That's two million years. One click is roughly 4 million years, and we didn't exist back then.

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Messier Certificate Program

Stop the clock! After ten years, I have finally found all 110 Messier Objects. You know those faint fuzzies in the night sky that Charles Messier in the 1700's recorded as "comet-like objects". It does not have to take ten years to accomplish this feat, but it did for me.

When I got my ETX 90 telescope in 1998, I started an astrolog (journal) of all my outings with my scope. Logging the first time I saw something or just to record the use of my scope over the years. Well it paid off, when a couple years ago I realized that the RASC had a Messier Certificate Program. If you want the details check out their website:

http://www.rasc.ca/messier/index.shtml

I thought I could do this, as I had already been attempting to see how many of the Messier's I could see with my ETX and I had knocked off about 72 of them with either my ETX or my 10X50 binoculars. Mind you, I am the sort of person that has a birding Life List too.

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The requirements are really quite simple. You only have to do three things to qualify. You have to see all 110 Messier Objects (according to the RASC Observer's Handbook), you have to find them by yourself (no help from others or computer aided telescopes) and you need to record some basic information for each object you observe (date, time, instrument used, location & remarks). My astrologs since 1998 had all this information recorded for what I had seen to date, so I was away to the races. Upon finding out about the RASC program I could have started all over again to record my Messier's, but I thought I would get good use out of my astrologs, so I started by reporting the first time I had recorded seeing a Messier. My first was M42 on January 26, 1998 and the list goes on from there. My last was M85 on May 18, 2007. You could easily do what I did in a year or two, but I took my time and whittled away at it until I recently decided to finish the list.

The last objects proved a little bit more of a challenge though, so I was borrowing larger telescopes from other members of the PAA. I would like to thank members Rene Bowe, Colin Cross, Mark Coady and Greg Haynes for the gracious use of their most excellent equipment. I could not have done it without your assistance (scopes only). I know of one other PAA member that has received the RASC Messier Certificate and that is Charles Baetsen (1993). Why not consider joining the club of Messier observers. It is easy and fun and anyone can do it with time, patience, and some good reference books (which are in the PAA library). It is a great way to learn the night sky.

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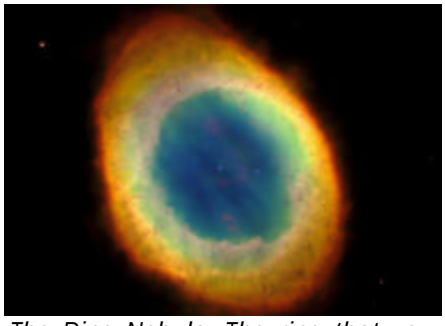
Earth's Future Really Is Written In The Stars

The spooky little smoke rings that predict of our destiny are called planetary nebula. They came by their name by accident. When discovered in 1779 the ring nebula was round as viewed from Earth. That, combined with the fact that planets were hot due to the recent discovery of Uranus, led to the nebula's categorization as "planetary."

Today, we know that planetary nebula never were planets. Instead they once were stars like our Sun. I say "once were" because planetary nebula are nothing more than the ghostly remains of a star long since dead. But the story they tell has great significance for those of us on the pale blue dot circling our Sun.

Like all things, stars are born, live out their lives, and ultimately expire. Their life expectancy depends on the star's type and size and can very from a few million years to ten billion years of more. Young, brilliant, super-hot stars are in the "live-hard-die-young" category. Their immense size and high temperature quickly burn up their fuel (hydrogen) by converting it to helium in a process called nuclear fusion. It's the process by which all stars live, but in this case the life will be comparatively short on a cosmic scale - perhaps just a few million years.

Happily our star, the Sun, is just about as average as a star can get. Dear old Sol is classified as mainstream star, a yellow dwarf to be precise. Stars like our Sun fuse their hydrogen fuel into helium at a relatively slow pace. Hence they have a long life expectancy. Our Sun will burn merrily along for about 10 billion years, and it's only middle aged. So we have another 5 billion years to go, right? Well, not quite.



The Ring Nebula. The ring that you see is the still-expanding gasses from an aging sun-like star that have been "puffed" out into space. Photo by NASA and the ESA.

Like people, as stars start to age they become larger in circumference. Our Sun has grown substantially since it was born. Its current growth rate is the same as that of your fingernails - an inch or so each year. But that adds up to quite an expansive girth in 1.5 billion years. As the Sun expands, the planets near it will feel the heat first. Mercury will be the first of the inner planets to be turned to toast, then engulfed by the expanding Sun. Next up is Venus. And then it's Earth!

But long before Earth is engulfed, the expanding Sun will have evaporated all of the water on Earth's surface. To survive, perhaps we will move out to the cooler suburbs of our solar system or another solar system far beyond our own.

Our study of planetary nebulae has told us where our star is heading. And with a billion plus years to go, we have time to figure out a solution or maybe evolve into heat- resistant super critters - all while working on our tan.

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St. Mary's Astronomical Clock

While on a trip around Poland in 2000, I had the good fortune to stumble upon a rare astronomical find. While touring the old town centre of the northern port city of Gdansk (the "G" is silent), I could not help but notice St. Mary's Church. It is reputedly the largest brick church in the world and is estimated to have the capacity to hold 24,000 people! This was quite a sight, but as I walked around the inside perimeter of the church I came upon this huge clock. The enclosed image does not quite fit it all in, but my brother (who stands six feet) is standing in front for scale. This 15th century astronomical clock when originally completed in 1470 was the tallest clock in the world at 14 meters (46 ft.). Not only does it tell the time, but also the day, month, year, the phases of the moon and the sun in relation to the Zodiac and a saints' calendar.

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This 15th century astronomical clock originally completed in 1470 by Hans Duringer of Torun.

What a mechanical wonder! It took Hans Duringer of Torun six years to construct, but it needed to be reconstructed after 1945, in order to restore it to its former glory. It still retains 70% of its original elements.

You just never know what astronomical wonder you might stumble upon in your travels, if you keep your eyes open and your guidebook too.

Rick Stankiewicz
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Dear Mr. Stankiewicz

This is how the note starts that arrived in my mail on May 10th.

"Thank you very much for the Frank hankock memorial award. My project was on eclipses. I learnd from the letter that Frank Hancock loved space and I can see how he can love it so much. Mankind has only learnd so much and maybe there is another planet with life on it. I am honoured to recive this award in memory of Mr. Hancock. I have been saving for a guitar and I can finally get one!"
Sincerely,
Evan Ruston

You are welcome Evan! As you can see from the above, we have a budding musical astronomer in the area. As you can tell, Evan was the winner of this year's Frank Hancock Memorial Award from the Trent Science Fair. Evan is from The Children's Montessori.

Rick Stankiewicz
President

The Sky This Month

For the locations of the planets this summer, go to www.space.com

MERCURY

Mercury is visible in the evening skies, reaching "greatest elongation East" on the 2nd. It's visibility decreases as it undergoes inferior conjunction on June 28th.

VENUS

Venus continues its stunning appearance in the western evening skies. The "evening star" is occulted by the Moon on June18th.

MARS

It is in Pisces until it moves into Aries late in the month. The red planet continues to brighten and now rises early in the morning well before the Sun.

JUPITER

At opposition on June 5th, Jupiter is at its biggest and brightest this month. It can be viewed all night.

SATURN

Saturn, in Leo, is in the West to Northwest in the evening. Through the month, vastly brighter Venus approaches it, and they pass each other by less than a degree on July 1 for North America.

URANUS

Uranus reaches west quadrature on June 9th. It is in Aquarius.

NEPTUNE

A telescope is usually necessary to view the most distant planet in the solar system. It is found in Capricornus.

METEOR SHOWERS:

There are no major meteor showers this month.

Our First Mini Starparty Weekend Was Perfect

A few Club faithful and our associated club guests began arriving around noon on Friday. I had just finished mowing when Joe Shields from the Bellville RASC pulled in with his camper. It wasn't long before PAA member Mark Coady's van arrived. John and Rob Duncan from Stony Creek and Bobcaygeon (our long distance members) pulled in shortly thereafter.

John pitched a tent that any self-respecting Bedouin would have been proud of while Rob and his three daughters jockeyed the motor home into position. Gord Simpson set up his scopes and ventured that he and son Kurt would sleep in the observatory.

As the sun began to set Mitch, Jennifer, Vicky, and Angela from the York Simcoe club pulled in and set up scopes, chairs, and a wee bar. Happily they set up shop right next to Denis Gauthier and Susan West, so we had a little activity centre going all night long.

Continued...

John Duncan from Stony Creek checks out Denis Gauthier's new Celestron 9.25 inch scope. Denis and Sue West are former PAA members who now live in Port Perry. I think we should invite them back to the fold, even if it is a long drive to the meetings.

The sky on Friday night was spectacular with everyone busy at their scopes until 4:00 am. We got to finish off Leo, the last of the spring constellations, and begin working our way through some of summer's celestial feast. Punctuating the superb observing conditions were a number of meteors, capped by one which left a smoking trail and then exploded when overhead. Zowie!

The Milky Way glowed beautifully as the assembled scopes swung through a host of spring galaxies, then into the globular star clusters and nebulae that dot the summer Milky Way. It was a marvelous night.

Saturday was almost a repeat of Friday. Rick Stankiewicz, Don McDonald and Colin Cross joined us to enjoy the stunning conjunction of the Moon and Venus. Then they were off on their personal Messier marathons.

Also joining us were Phil and Lena, two of our newest members, another fellow named John who will be joining soon, as well as Ken Oaks and his wife who are just getting involved in the hobby. Ken has a small Nikon spotting scope, John has an ETX 125, while Phil and Lena are using binocular for their observing.

BHO had the honour of being the location at which Rick completed his Messier list using Mark Coady's 8-inch Intelliscope (without the intelli part engaged). Both Mark and I had the honour of witnessing Rick's accomplishment – both literally and figuratively as we signed his Messier Card. It took Rick almost 10 years, but he finally nailed all 109 Messier objects without any computer assistance. Nice going Rick. The RASC will be sending him his certificate, soon. M85 was his last target, and I'll bet it never looked brighter or better.

At midnight, the great cloud roof closed over us. Unbeknownst to any of us a Bud-thirsty tribe of beer bottles had snuck up on us during the night. As we switched from red to white light we suddenly became aware of the fact that we were surrounded. Happily everyone had been trained in the deadly art of KungBrew, so we fought back and by sunrise not a bottle was left standing. That'll show 'em.

Sunday night was the best night of all with the temperature dropping a bit below the comfort level, but the sky was crisp and clear all night long. Once again we had the scopes running until 4:00 am. What a fantastic night! Saturn was magnificent at 120 power. Gord Simpson got a stunning image of M51 to go with the sock-knocker of M81 that he had taken Friday night. And I began working my way through the Coma Cluster of galaxies. It is almost impossible to view just one galaxy as the field of view is usually home to a group of two, three, and in one case four galaxies. Neat stuff!

Mitch, Vicki and Jennifer (L to R) are skilled amateur astronomers who also know how to party and enjoy the company of their fellow astronomers. They're a happy addition to any Star-party. We're glad they could make it over from the York Simcoe Club.

What a magnificent batch of memories we cooked up that weekend. We'll probably do it again next year. Hopefully more members from all of the clubs will get out and join the fun. Remember, you can't buy astronomy, you have to learn it. So get out under the stars. The big outdoor classroom always has space for more students.

John Crossen
JohnCstargazer@aol.com

J O K E ! J O K E ! J O K E ! J O K E !

The New York Times, among other papers, recently published a new Hubble photograph of distant galaxies colliding. Of course, astronomers have had pictures of colliding galaxies for quite some time now, but with the vastly improved resolution provided by the Hubble Space Telescope, you can actually see lawyers rushing to the scene...

! J O K E ! J O K E ! J O K E ! J O K E

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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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:

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

NEXT ISSUE'S DEADLINE IS
Sept. 1, 2007
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MEETINGS

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

Moon Phases

First Quarter	**June 22, 2007**	**July 22, 2007**	**August 20, 2007**
Last Quarter	**June 8, 2007**	**July 7, 2007**	**August 5, 2007**
New Moon	**June 14, 2007**	**July 14, 2007**	**August 12, 2007**
Full Moon	**June 30, 2007**	**July 29, 2007**	**August 28, 2007**