Peterborough Astronomical Association
The Reflector
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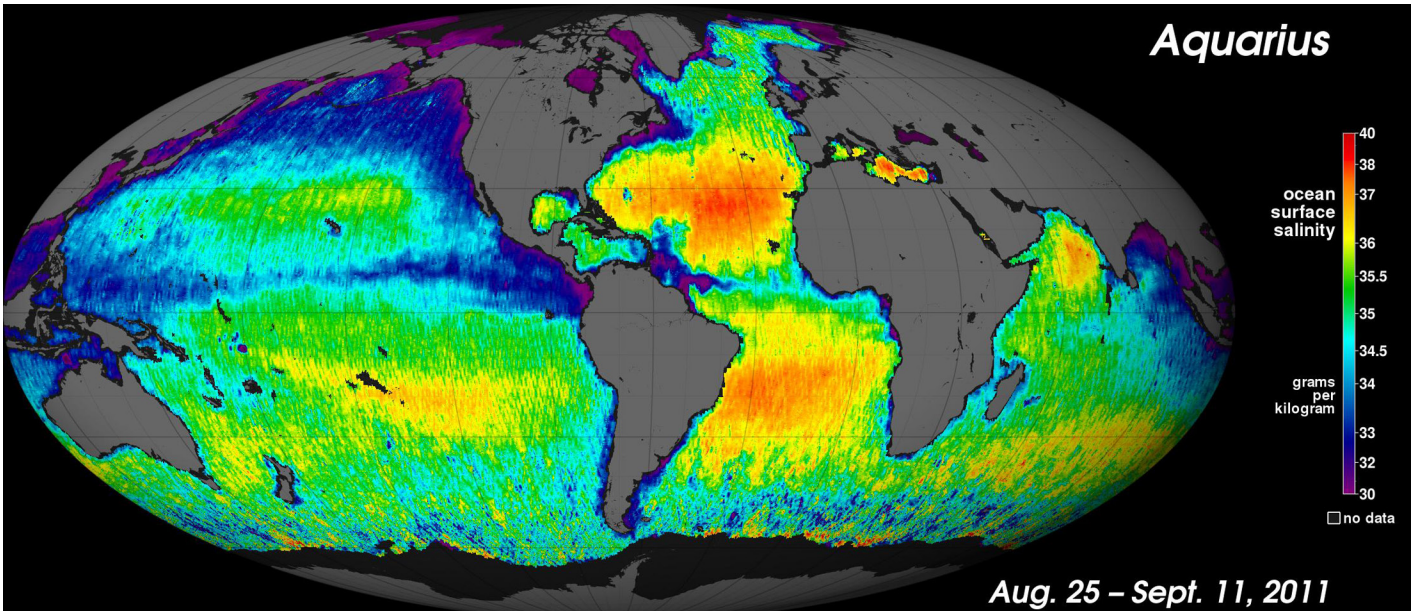
The Hidden Power of Sea Salt Revealed



Aquarius produced this map of global ocean salinity. It is a composite of the first two and a half weeks of data. Yellow and red represent areas of higher salinity, with blues and purples indicating areas of lower salinity.

by Dauna Coulter

Last year, when NASA launched the **Aquarius/SAC-D** satellite carrying the first sensor for measuring sea salt from space, scientists expected the measurements to have unparalleled sensitivity. Yet the fine details it's revealing about ocean saltiness are surprising even the Aquarius team.

"We have just four months of data, but we're already seeing very rich detail in surface salinity patterns," says principal investigator Gary Lagerloef of Earth & Space Research in Seattle. "We're finding that Aquarius can monitor even small scale changes such as specific river outflow and its influence on the ocean."

Using one of the most sensitive microwave radiometers ever built, **Aquarius** can sense as little as 0.2 parts salt to 1,000 parts water. That's about like a dash of salt in a gallon jug of water.

"You wouldn't even taste it," says Lagerloef. "Yet Aquarius can detect that amount from 408 miles above the Earth. And it's working even better than expected."

Salinity is critical because it changes the density of surface seawater, and density controls the ocean currents that move heat around our planet. A good example is the Gulf Stream, which carries heat to higher latitudes and moderates the climate.

"When variations in density divert ocean currents, weather patterns like temperature and rainfall are affected. In turn, precipitation and evaporation, and fresh water from river outflow and melt ice determine salinity. It's an intricately connected cycle."

The atmosphere is the ocean's partner. The freshwater exchange

see "Aquarius" on page 16

President's Message

Spring Ahead

March is that time of year when we eagerly anticipate warmer weather, clear skies and some good viewing opportunities. Venus, Jupiter Mars and Orion will all be out there waiting for our eyes, binoculars and telescopes. Let's get out there, shake off the winter blues and enjoy the skies.

A friendly reminder too, that if you have not renewed your membership dues for 2012, this could be your last issue of *The Reflector*.

March 31st we celebrate Earth Hour. Please join us on Armour Hill from 7:00 p.m. until midnight to help with our public outreach activity.

Rodger Forsyth
PAA President

Letter from the Editor

March Madness usually refers to the U.S. College Basketball championship, but for *The Reflector* it can also mean we have a plethora of Mars related articles. The name March derives from the Roman calendar which named this month in honour of the Roman god of War, Mars. John Crossen doesn't disappoint with his Mars articles.

Also, have two articles about Copernicus. Who knew that atomic element 112 is now named copernicum? And Rick Stankiewicz provides a review of Owen Gingerich's book, searching for copies of Copernicus's *De Revolutionibus*.

Vice-President, Dean Shewring reports on the February PAA meeting and Mike McCarthy submitted some eye-catching images from his February 19-20 broadcast.

Don't forget that we will be on Armour Hill on Saturday, March 31 for Earth Hour. See you there!

Phillip Chee
Editor, The Reflector

Peterborough Astronomical Association

The Reflector is a publication of the Peterborough Astronomical Association (P.A.A.) Founded in 1970, the P.A.A. is your local group for astronomy in Peterborough and the Kawarthas.
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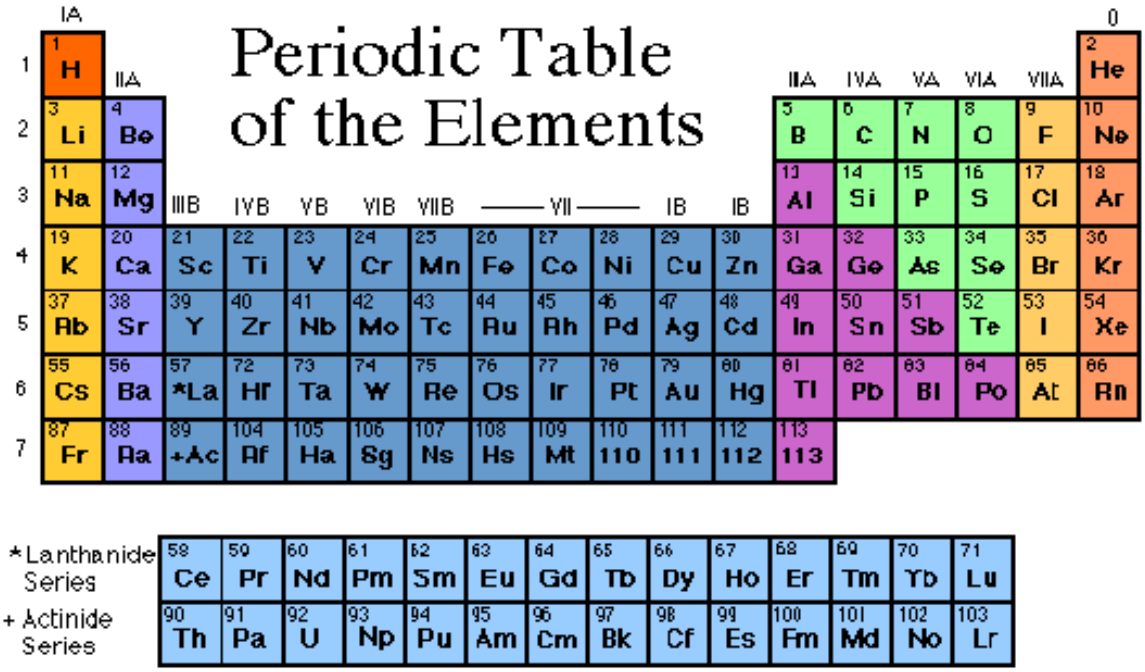
Honoring Copernicus
Three New Elements Added To The Periodic Table



Periodic Table of the Elements. Provided by NASA

Tammy Plotner

On November 4, 2011, the General Assembly of the International Union of Pure and Applied Physics (IUPAP) met at the Institute of Physics in London, to approve the names of three new elements…one of which will honor the great Copernicus. Their names are: Element 110, **darmstadtium** (Ds), Element111, **roentgenium** (Rg) and Element 112, **copernicium** (Cn).

Are these new elements? Probably not. All the new ones were discovered long ago, but groups like IUPAC elect names to be used in scientific endeavors. Not only does this include the element, but new molecules which belong to it. As a general rule, these "new elements" are given names by their discoverer—which also leads to international debate. The elements can be named after a mythological concept, a mineral, a place or a country, a property or a very known scientist…even an astronomer!

As for element 112, this extremely radioactive synthetic element can only be created in a laboratory. Copernicium was created on February 9, 1996 by the Gesellschaft für Schwerionenforschung, but its original name—**ununbium**—didn't get changed until almost two years ago when a German team of scientists provided enough information to prove its existence. When it was time to give it a moniker, the rules were that it had to end in "ium" and it couldn't be named for a living person. On February 19, 2010, the 537th anniversary of Copernicus' birth, IUPAC officially accepted the proposed name and symbol.

This "name calling" process comes from the Joint Working Party on the Discovery

See "Periodic Table" on page 15

February Meeting Highlights

Dean Shewring

We had an excellent meeting on February 3, marred only by the absence of president Rodger Forsyth who was sidelined at home recovering from an appendicitis operation. The twenty-one members present signed a humorous get-well card for Rodger to help lighten his day.

Our business meeting was quite productive this time. Not only were we able to announce the approval by the City of Peterborough for all our planned public events in the city this year, but we passed a motion to purchase the required liability insurance. This $2 million coverage will allow us to host public events at any arranged venue with an assurance of protection in case of incidents.

We sampled a review clip of the recent Stargazing Live event from the U.K. with Professor Brian Cox and comedian and presenter Dara Ó Briain. This challenging serieshad been broadcast on BBC Two television just a couple of weeks prior to our meeting. Stargazing Live was shown over three days, consisting of a one hour live broadcast from Jodrell Bank Observatory, followed by a half-hour question and answer session each night. It included participation from the local area astronomy clubs and cooperation from a local town which turned off all its lights for one evening to support reducing light pollution. These programs demonstrated not only how popular astronomy is in Britain, but provided yet another example of how a successful collaboration between scientists and public broadcasters can aid in the promotion of science education.

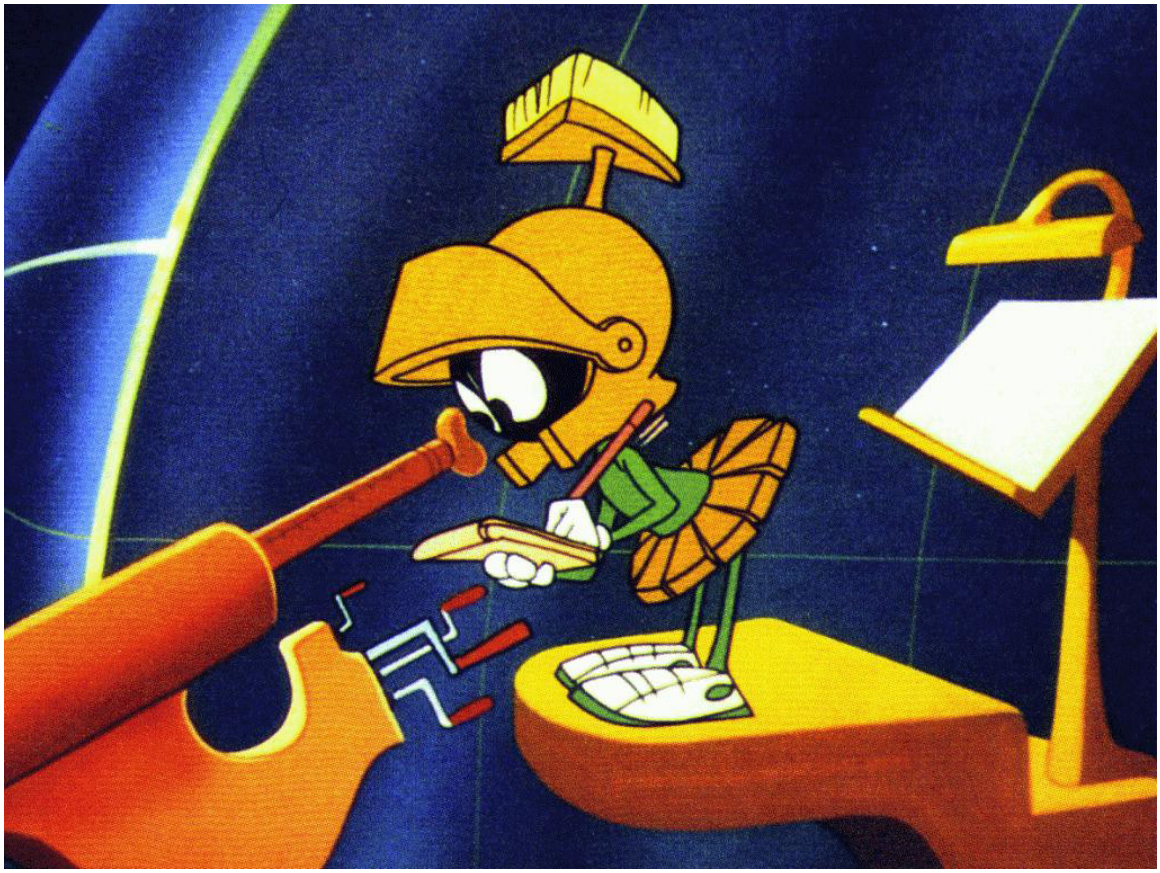
Peter McMahon, who now writes a regular "Wilderness Astronomer" column for *SkyNews*, presented an illustrated talk on Canada's Wild Skies. He spoke mainly of his travels to the dark sky parks in Ontario and Western Canada. He brought insight not only on the darkest sky preserves and at which locations the skies are clear most often, but also the sites with the best amenities for travellers. This was helpful for anyone excited about exploring our great country with an eye to observing at our best night skies sites.

Peter plans to travel west again this autumn to become Astronomy Writer in Residence at Jasper National Park. He is eventually hoping to travel to the east coast in the near future to visit several dark sky preserves in Eastern Canada and add to his presentation on the best dark sky sites.

After his talk, Peter demonstrated a new 5" collapsible Sky Watcher Dobsonian telescope along with image stabilized binoculars for members to check out. All-in-all, another fine evening for the PAA.

Mars myths and misconceptions

A Martian Viewpoint



As a Martian I'm upset about the way you Earthlings think of us. We've been stereotyped and misunderstood for thousands of years. It's time we set things straight.

It all goes back to the Romans who took the name of their god of war and gave it our planet. Because of a little iron oxide in our soil our planet appears to be red to the human eye. Since then we've been labelled "the Angry Red Planet" and "the Planet of Blood." Believe me, it hasn't been fun being the villain in a string of B-rate sci-fi flicks.

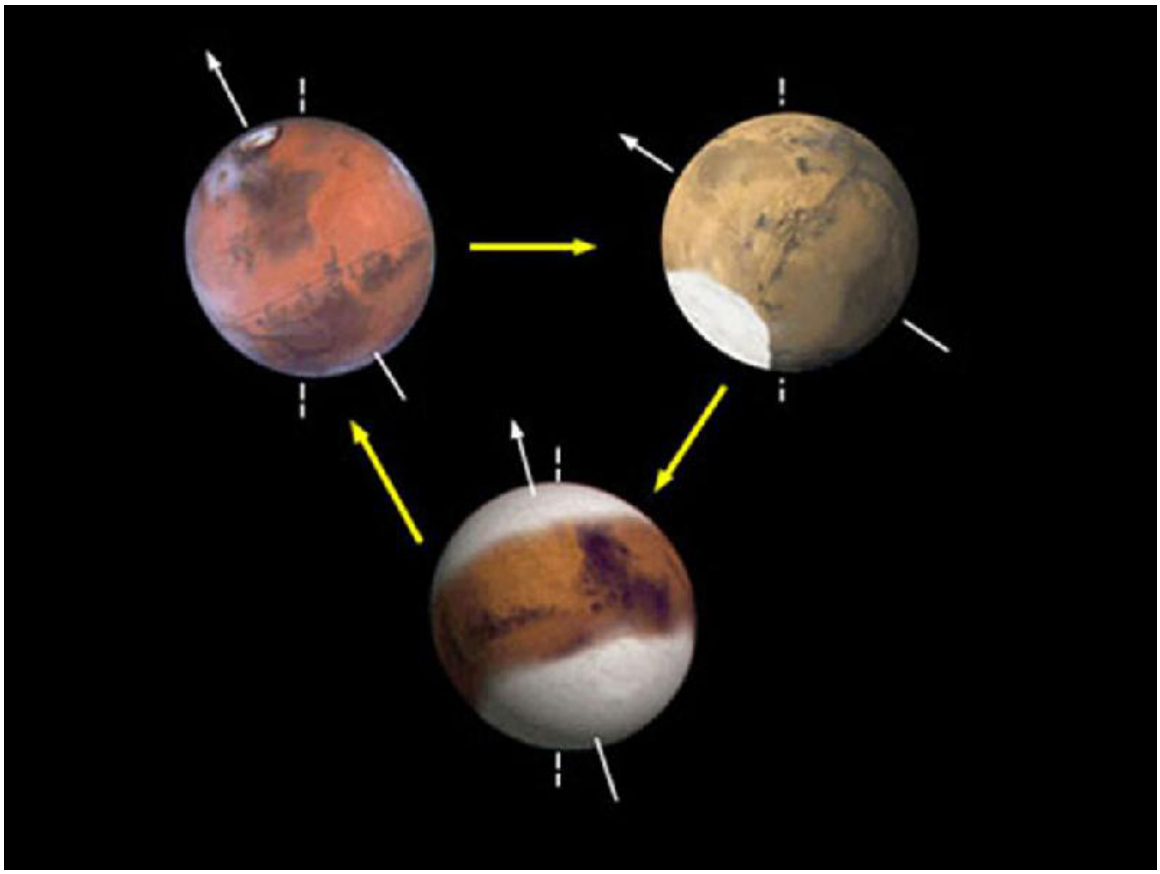
Even your scientists had weird ideas about our happy home. Percival Lowell thought he saw canals on our planet. He assumed that we were running out of water and making a last ditch (pun intended) effort to save ourselves by hording the last aqua. The truth is he misunderstood the astronomer Giovanni Schiaparelli who called the lines *canali* which means channels in Italian. It is also not our fault that the Panama Canal was being completed and the whole population of Earth was caught up in canal-mania.

Lowell's bad eyesight and failure to grasp the Italian language did inspire H.G. Wells's "War of the Worlds" which resulted in a radio played that scared the pants off you guys and resulted in riots in South America. We Martians snickered a lot at that one.

Then George Pal went on to produce the film version of the book in the early 1950s. It was a big-budget colour film with great acting and special effects that still stand up today. It was then followed

See "Marvin" on page 15

Have a Close Encounter with Mars in Buckhorn



Changes in Tilt of Mars' Axis. Modern-day Mars experiences cyclical changes in climate and, consequently, ice distribution. Unlike Earth, the obliquity (or tilt) of Mars changes substantially on timescales of hundreds of thousands to millions of years. At present day obliquity of about 25-degree tilt on Mars' rotational axis, ice is present in relatively modest quantities at the north and south poles (top left). This schematic shows that ice builds up near the equator at high obliquities (top right) and the poles grow larger at very low obliquities (bottom) (References: Laskar et al., 2002; Head et al., 2003). *Image courtesy of NASA's Mars Science Laboratory web site.*

John Crossen

Mars is back and so is Buckhorn Observatory. Friday, March 16 marks the season opening for the Observatory. If the night is clear the 5-inch apochromatic refractor will be trained on our planetary neighbour. If not, well Mars will be around all spring.

With a bit of luck, 2012 will be a big year for our red-faced cousin. In August the NASA Rover, **Curiosity**, is scheduled to land on Mars. It will be a tension-filled touch-down because **Curiosity** is nearly as large as a compact car and almost as heavy. This called for a new landing strategy.

To set wheels on Mars, **Curiosity** will first plummet through the thin Mars atmosphere in a capsule. If the heat shield holds up, a drag shoot will be deployed to further slow down **Curiosity's** descent. As the rover nears the planet's surface the shoot will be jettisoned and **Curiosity's** retro-rockets will fire up to further slow the final phase of the landing. Eventually the rover will touch down and the rockets will switch off. It's a combination of the old space capsule returns from the Apollo Moon missions of the 1970s and Buck Rogers. So how come they won't just do the tested "bounce down" that landed

See "Buckhorn" on page 14

How Fast Does the Sun Move?

They say a picture is worth a thousand words, so without using too many words of my own I will let you look at the following images and figure out the answer to the question posed above, given the following information:

The first image was taken at 5:51:50 a.m. on May 11, 2011 looking east from Keene. The disk of the Sun was just rising over the maple ridge, fortuitously in a convenient gap in the trees.

The second shot was taken at 5:54:53 a.m., so you can see that the Sun appears to have moved it's own apparent width (approximately the same size as the Moon—½ degree) in just three minutes.

Both images shot with a tripod mounted Canon 400D and Sigma lens at 238mm; ISO 100; f/5.6; and between 1/1600 & 1/4000 sec.

Early Riser,
Rick Stankiewicz

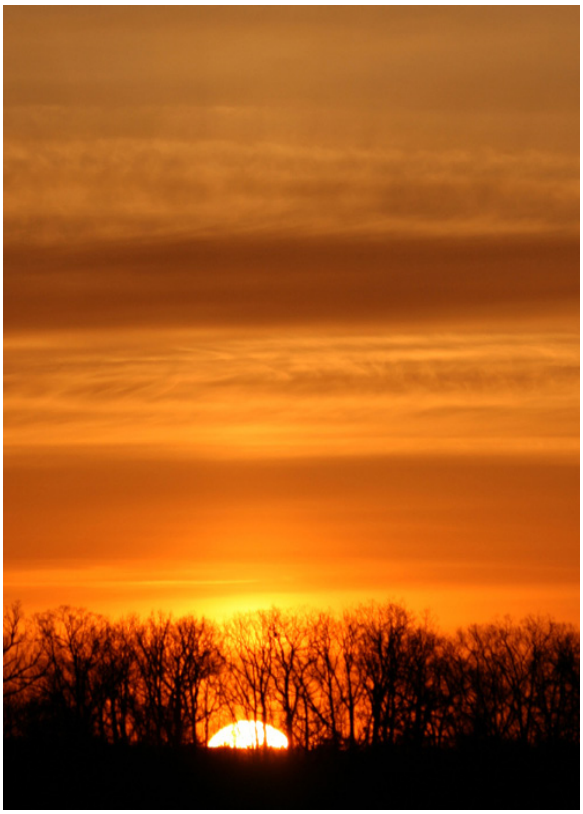
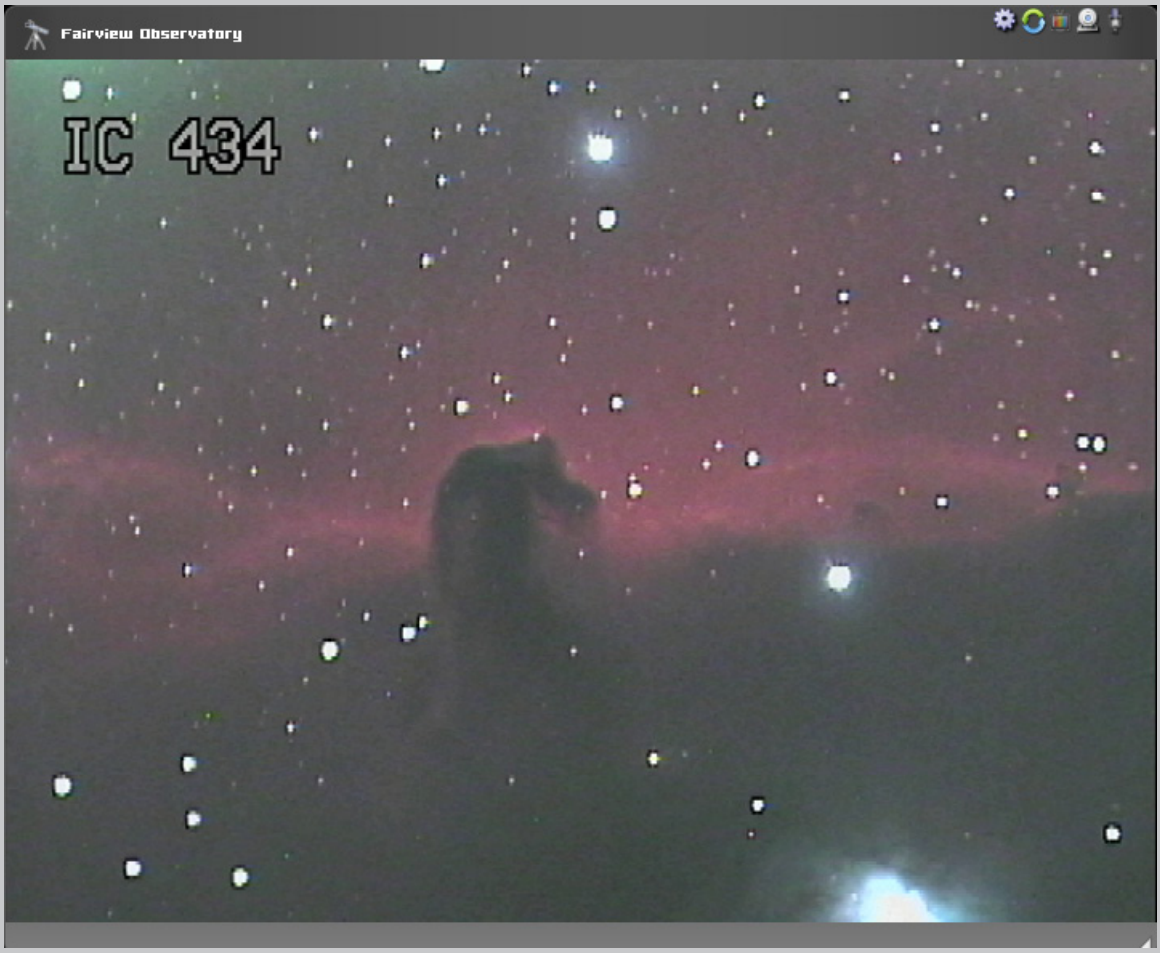


PHOTO GALLERY

Fairview Observatory Images



Hi Phillip: These are some screen shots of my broadcast on Feb 19-20: Top, the Horse Head Nebula (Ic 434, 150 sec); Lower left, M64 The Black Eye Galaxy (80 sec) and lower right, M97 The Owl (150 sec).

If it isn't too late could you include it in the upcoming reflector?

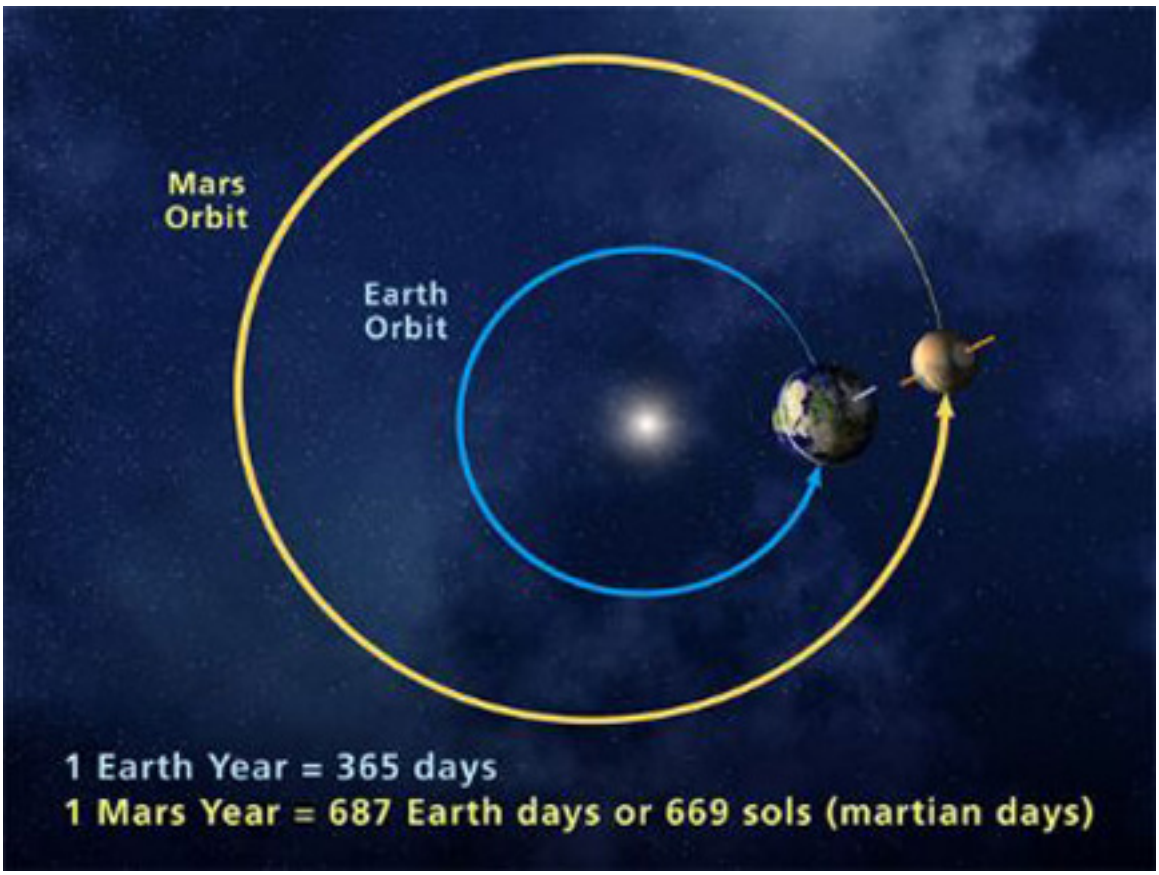
Thanks

Mike McCarthy

February Alignment

On February 25, 2012, the crescent Moon posed for a family portrait with Venus on its way to a similar fate the next night with Jupiter. Photos taken by Phillip Chee with a Nikon D200, ISO 400 and Nikkor 35mm f/2, f/2.2, 1 second (top) and 200mm f/4, f/4, 1/500 second (bottom).

Mars is a Big Show-off in March



Mars and Earth Elliptical Orbits. Earth and Mars are shown here at a time when their elliptical orbits come close together. This would have been the situation in 2003. This year the distance between the two planets will be nearly twice that of the 2003 encounter. It will be their closest encounter for 2012, but not nearly so close as previously.

John Crossen

Mars will be at its closest approach to Earth on March 5 so observers with telescopes will be admiring some sketchy surface detail and the polar ice cap on nights when the sky is steady. This year's close encounter with the Red Planet won't be as exciting as the one in 2003 when Mars made its closest approach to Earth in 50,000 years. That was spectacular. On this year's approach will be Mars will be about twice the distance it was in 2003. That's because both Earth and Mars have elliptical orbits. Here's how it works.

Mars is farther away from the Sun than Earth. So Mars has a longer orbital path around dear old Sol. In short, we have the inside track. Roughly speaking every two times Earth goes around the Sun Mars only completes one lap.

So once every two years Mars and Earth pass each other. But our orbits aren't perfectly round. They're elliptical. That's why on some close encounters we are closer than on others.

If you have trouble spotting Mars, wait until March 7. Mars and the Full Moon

see "March Madness" on page 13

The Book That Nobody Read

Chasing the Revolutions of Nicolaus Copernicus

BOOK REVIEW

Owen Gingerich
ISBN-10: 0147501377
ISBN-13: 978-0147501370
Penguin, 2005

Rick Stankiewicz

This book reads like a detective novel. It will take you around the world, but in more than 80 days, as it took decades to research and compile the material used by the author. It is well researched and nicely written too. There are many pieces to this puzzle, but Prof. Owen Gingerich "puts it all together" for you and this is no small feat for a non-fiction work.

This book is really a book about the adventures and misadventures of doing research for another book by the same author, *An Annotated Census of Copernicus' De Revolutionibus* (2002). He set about the challenge of recording a detailed "census" of the known first and second editions of the famous Polish astronomer, Nicholas Copernicus's book, *De revolutionibus orbium Coelestium libri sex*, (Latin for, *Six Books on the Revolutions of the Heavenly Spheres*), or *De revolutionibus*, for short. This was no easy feat, given that this book was first published in 1543, at Nuremberg and then reprinted in 1566 at Basel, Germany. How many books even still exist and where in the world they are is one thing, but the author personally tries to see and record as many of them as possible. Lucky for him he was able to take advantage as a world-renowned academic and was therefore involved with the lead up to and celebration of Copernicus's Quinquecentennial (500th anniversary of his birth, at Turin in 1473) in 1973.

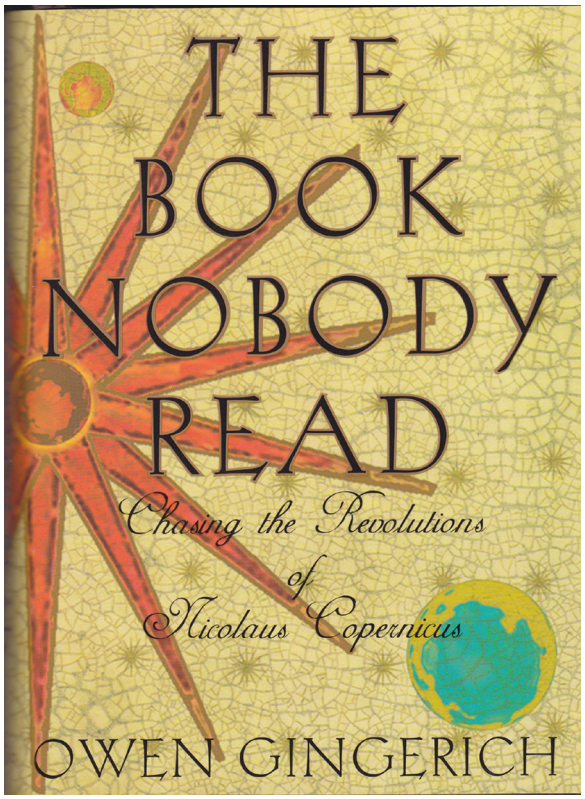
Proving who owned the books in some cases was an added quest that challenged the author too. This is called the provenance of a book, or I would say, the pedigree of a particular book. Tracing the ownership of a copy from beginning to end. Some have changed hands very little, while others were around the world and back again. The authors Census recorded at least 601 books and there are no doubt some in private collections that will never be recorded.

Interestingly, this book is not all about Copernicus, as you will learn about the historical context of many other famous astronomers that followed him and their connection to *De Revolutionibus*. The likes of Rheticus, Galileo, Kepler, Brahe and a list of characters I never knew existed.

Part of the legacy of this book (*That Nobody Read*) is Appendix 2, which lists the last known locations of the publicly available copies listed by country and city. Canada figures in this listing too. McGill University has our country's only first edition of *De Revolutionibus*, while U of T, Ottawa U and McGill all have second editions. The Toronto copy gets several mentions throughout the book too.

If you collect old books, like astronomy, history and a good "who done it", then this book is for you. I suspect you will learn more than you bargained for, I know I sure did.

Why the title for this book, you ask? By reading it you will see how the author methodically went about disproving a myth about the use and reading of *De Revolutionibus*. Based on the very sound premise, that if annotations in a books margins are an indication of whether a book was read, then *De revolutionibus* had a good readership and use in its day and the centuries that followed.



Here's a Crash Course in Unhappy Landings on Mars

DETAILS OF MARTIAN SURFACE.Like post cards from Mars, Spirit and Opportunity have sent we Earthlings over 164,626 images and more data than Dr. Who could handle.

JOHN CROSSEN

IF YOU'RE TRAVELLING TO Mars, you are advised to take out a hefty insurance policy and make certain that your Blue Cross is up to date. The reason is simple—historically Mars has been the bad luck king of international space missions. In fact nearly two thirds of the Mars missions of ended in failure with the Americans, British, Canadians, Europeans, Japanese and Russians all experiencing the bitter taste of defeat.

Let's start with the most recent "oops" on record, the Soviet **Phobos-Grunt** mishap. By the way "grunt" means "ground" in Russian. It's a fitting name for a mission that was designed to land on Mars' moon Phobos and return to Earth with soil samples.

Unfortunately, the rocket never fully reached orbit and plunged back to Earth off the coast of Chile—sans samples. That was January 16 of 2012.

Also onboard with the Russian Phobos-Grunt spacecraft was the Chinese **Yinghuo-1 mission**. Intended to be the first Chinese mission to orbit the Red Planet, it joined **Phobos-Grunt** in an unscheduled Pacific splash-down.

Next up on the Mars "hit list" is the British **Beagle Lander**. Unfortunately it took the moniker "Lander" a bit too seriously and is now spread out across Isidis Planitia on the Martian surface. That was on December 25 of 2003.

However there was one silver lining in this dark cloud. The **Lander** rode into

see "Rovers" on next page

continued from previous page

Rovers

space atop the European Space Agency's **Mars Express Orbiter**. As the two entered Mars orbit the lander, **Beagle**, was released and never barked home again. The **Mars Express Orbiter** continued on, and is still successfully photographing and surveying the planet.

Failure also visited the Japanese and Canadian space programs in 2003 when fuel problems scuttled the Nozomi orbital program. Hitching a ride with the Japanese mission, the Canadian instrument would have been our first to orbit another planet.

As if technological failures weren't enough, the 'human factor" entered the equation in September of 1999 and resulted in the failure of NASA's Mars Climate Orbiter. One of the design teams was working in imperial measurements while the other team did their work in metric. $165,000,000 later they were rewarded with a big boom.

While the number of Mars failures still outstrips the success rate, things have improved greatly. Mars Pathfinder successfully landed the **Sojourner Mars Rover** in 1997. The rovers, **Opportunity** and **Spirit,** successfully landed and **Spirit** is still performing perfectly. That's eight years longer than expected!

Despite all the failures we now know that Mars has water and the potential to harbour life. The planet's surface has been mapped in detail and we have mineral maps.

A Canadian experiment aboard the **Phoenix Lander** has helped plot the weather and during the days of the Pathfinder mission you could actually receive daily weather reports from Mars. Believe me they made the Canadian winter seem very mild.

As of this writing the **Mars Curiosity Rover** is rocketing towards an August 2012 Martian encounter. Here's hoping for a bon voyage and happy landings!

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March Madness

will be rising at almost the same time with Mars in the lead. It will be a butterscotch-red sphere just above the Full Moon.

If it is cloudy on March 5, don't be disappointed. There will be other chances during the month of March and to be honest, the human eye won't be able to discern and difference in the size of Mars on the night of the closest approach or a week later. But Mars isn't the only show off in March.

Little Mercury will be at its highest in the evening sky. To spot the swift messenger look into the afterglow of the setting Sun — about 50 minutes after sunset. Mercury will be close to the horizon, so the western view across a nearby lake is ideal.

Not to be outdone, Venus will also be on a high during March. In fact on March 27 it will reach its highest point above the horizon. You can see Venus quite easily in the evening sky. Venus is very bright thanks to its cloud-covered surface that reflects the Sun's light so intensely. If the Moon was as reflective as Venus, you could easily read a book by moonlight on the night of a Full Moon.

Two other planets will catch your eye in March. The first is giant Jupiter. The big fella will be nearing its last show for the season. As Jupiter sets, it will pass with 3 degrees of rising Venus. That's on the evenings of March 12th through the 14th. So if you haven't had a look at Jupiter through a telescope or binoculars, be quick like a bunny.

The other planet is Saturn. The ringed thing will be rising in the East about two hours after the Sun sets. It's best to wait a couple of more hours to allow Saturn to rise above the muck and mire of the atmosphere near the horizon. That's the time to hoist your telescope for a gander at our solar system's glamour boy.

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Buckhorn

Opportunity and **Spirit** eight years ago? **Curiosity** is too big and too heavy.

Speaking of the previous Rovers, **Opportunity** is still roving merrily along relaying photographs and data back to Earth. If **Spirit** hadn't become stuck in the sand, both Rovers would still be running—eight years after their predicted expiry date. I hope **Curiosity** will share the same good fortune, plus it won't have to rely on solar power.

Instead **Curiosity** is nuclear powered and for a good reason. Not only is it bigger than any previous rover, it is also faster and far more complex in terms of the number of and the level of sophistication its on-board laboratories will perform. In short, it needs more power—a lot more than the Sun delivers to Mars especially during the long Martian winter. It also needs reliable power—the kind that future astronauts will require when exploring the planet.

Meanwhile back on Earth Buckhorn Observatory is about to launch into a little Mars exploration of its own. The five-inch apochromatic refractor is the ideal optical system for revealing lunar and planetary detail.

What can visitors expect to see? If the night is clear and the atmosphere is steady Mars will show smudgy gray bits of surface detail against its butterscotch-red surface. The polar ice cap will be distinctly visible. Plus we'll also have Jupiter to view along with the galaxies in Leo, the Orion Nebula and a host of other celestial showpieces.

The observatory will be open on Friday and Saturday nights during March, April and May. Then we shift into high gear with nightly observing sessions centred either side of the New Moon phase.

Hopefully I'll see you. And for sure I'll see this close approach of Mars.

The Sky this Month

Mercury in western evening sky in early March reaching perhelion on the 2nd and greatest elongation east (18°) on the 5th. Rapidly dims during second week of March as it reaches inferior conjunction on the 21st.

Venus in western evening sky. Lies within 3° of Jupiter between the 11th and 15th. On the 26th the waxing crecent Moon is 1.8° S and is at greatest elongation east (46°) on the 27th.

Mars rises mid-evening in eastern Leo retrograding and brightening to its March 3 opposition.

Jupiter in the western evening sky in Aries and sets mid-evening. Joins Venus towards mid-month. Crescent Moon passes 3° N on the 25th.

Saturn retrograding in Virgo northeast of Spica and rises mid-evening.

Zodiacal Light visible in the west after evening twilight for two weeks from the 10th.

Moon Phases

Full Moon	4:39 PM	March 8
Last Quarter	8:25 PM	March 14
New Moon	11:37 AM	March 22
First Quarter	2:41 PM	March 30

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Periodic Table

of Elements, which is a joint body of IUPAP and the International Union of Pure and Applied Chemistry (IUPAC). From there it is given to the General Assembly for approval. Dr. Robert Kirby-Harris, Chief Executive at IOP and Secretary-General of IUPAP, said, "The naming of these elements has been agreed in consultation with physicists around the world and we're delighted to see them now being introduced to the Periodic Table."

The General Assembly consists of 60 members from different countries. These delegates are elected from national academies and physical societies around the world. The five day meeting, which started session on Monday, October 31 will end today. The meeting included presentations from leading UK physicists, and the inauguration of IUPAP's first female President, Professor Cecilia Jarlskog from the Division of Mathematical Physics at Lund University in Sweden.

Original Story Source: Institute of Physics News Release.

This was originally published on *Universe Today* http://www.universetoday.com/90685/honoring-copernicus-three-new-elements-added-to-the-periodic-table/

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Marvin

by a British TV series of the same title and later a rather lame Steven Spielberg remake. Honestly Stevie, you could have done better.

Right up until the 1960s you Earthlings had us all wrong. Then the Viking missions took pictures of us. Instead of being what you thought were dark fields of strange vegetation on our surface you saw valleys, mountains and a shape called Syrtis Major that turned out to be deeper than your Grand Canyon and would stretch from coast to coast in either the United States or Canada. We've also been the centre of one of the greatest hoaxes ever conceived on your planet.

Remember 2003 when our planet made its closest approach to Earth in 50,000 years. Unfortunately during the intervening 48,000 years your communications skills far outpaced your common sense abilities. So when someone said that Mars would appear to be as large as the Full Moon during the 2003 close approach you accepted it. After all it was on the Internet and that means it has to be true!

For that bit of muddled thinking to work Mars would have to be just 800,000 kilometres from Earth. If you read a book you'd have known that Mars was well over 55,000,000 kilometres distant at its closest approach.

Despite that enough meadow-headed Earthlings believed the myth that the rumour has persisted for nine years. You even built websites dedicated to the misconception. Then again you do the same for pyramid power, magic crystals and the therapeutic miracles of magnetic bracelets.

My point here is that you don't have to worry about Mars invading your planet. We much prefer the company of intelligent life.

John "Marvin" Crossen

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Aquarius

between the atmosphere and the ocean dominates the global water cycle. Seventy-eight percent of global rainfall occurs over the ocean, and 85 percent of global evaporation is from the ocean. An accurate picture of the ocean's salinity will help scientists better understand the profound ocean/atmosphere coupling that determines climate variability.

"Ocean salinity has been changing," says Lagerloef. "Decades of data from ships and buoys tell us so. Some ocean regions are seeing an increase in salinity, which means more fresh water is being lost through evaporation. Other areas are getting more rainfall and therefore lower salinity. We don't know why. We just know something fundamental is going on in the water cycle."

With **Aquarius's** comprehensive look at global salinity, scientists will have more clues to put it all together. **Aquarius** has collected as many sea surface salinity measurements in the first few months as the entire 125-year historical record from ships and buoys.

"By this time next year, we'll have met two of our goals: a new global map of annual average salinity and a better understanding of the seasonal cycles that determine climate."

Stay tuned for the salty results. Read more about the Aquarius mission at aquarius.nasa.gov.

Other NASA oceanography missions are Jason-1 (studying ocean surface topography), Jason-2 (follow-on to Jason-1), Jason-3 (follow-on to Jason-2, planned for launch in 2014), and Seawinds on the QuikSCAT satellite (measures wind speeds over the entire ocean). The GRACE mission (Gravity Recovery and Climate Experiment), among its other gravitational field studies, monitors fresh water supplies underground. All these missions, including Aquarius, are sponsors of a fun and educational ocean game for kids called "Go with the Flow" at spaceplace.nasa.gov/ocean-currents.

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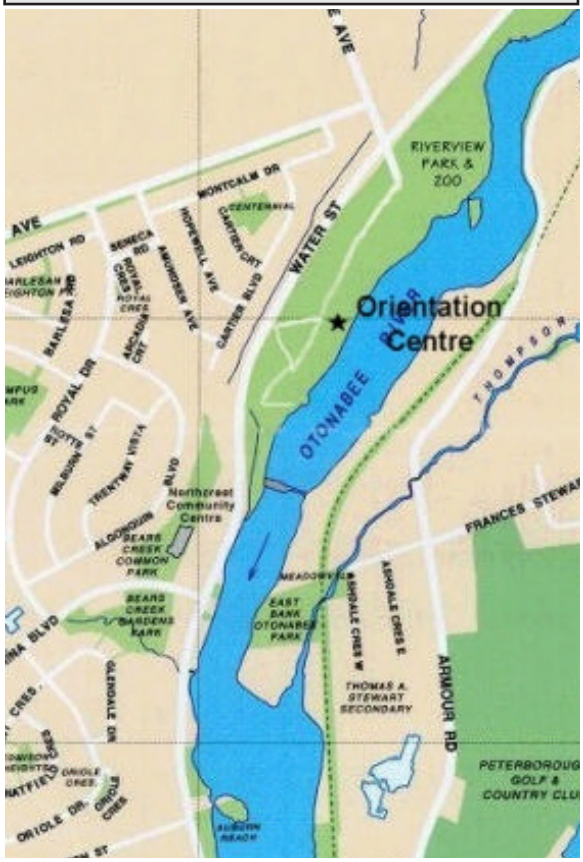
Articles

Submissions for *The Reflector* must be received by the date listed below. E-mail submissions are preferred (Microsoft Word, OpenDoc, ASCII and most common graphic formats are acceptable). If your article contains photso or graphics, please provide a separate file for each. 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:

phillip.chee@gmail.com

NEXT SUBMISSION DEADLINE:
MARCH 25, 2012



Meetings

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