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PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR

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Editorial

As this is my final issue of The Reflector, I bid everyone farewell. I will, however, continue to be a member of the PAA. If you are not at the next meeting, I wish you a Merry Christmas and a Happy New Year!

Shawna Miles
Shawna.miles11@yahoo.com

President's Message:

Welcome fellow stargazers and PAA members/readers. By the time you read this, we will have had our first few meetings since our summer hiatus. I trust everyone has had a good summer and fall and managed to squeeze in a little bit of astronomy. With International Space Station transits, meteor showers, total lunar eclipses, star parties, asteroids and comets, who could ask for more?

It is nice to see The Reflector up and running for another season too. Remember, this is your monthly newsletter, so please support it. If you don't submit something (anything) from time to time, you can't expect it to change or grow with your needs as a PAA member. Please consider making submissions, at least every now and then. I know I don't have to sell you on the merits of this excellent club publication (your reading this now right?), but you may not appreciate just how good this publication is. It has been rated one of the best of its kind in Canada and praised by the likes of Terrence Dickinson (one of Canada's premier astronomers). We have lots to be proud of in The Reflector. A tip of the hat to our current Editor, Shawna Miles and those that have gone before her, like Charles Baetsen. In case you don't know, we are still looking for a replacement for Shawna as a new editor of The Reflector. Regrettably, if we do not have anyone capable of the task by the end of December we will have to reconsider the fate or at least the format of the PAA's monthly newsletter. If you haven't already done so, please give this important role for the PAA some careful consideration and let me know if you are ready, willing and able to try on the role as Editor.

Shawna, on behalf of the PAA I would like to take this opportunity to personally thank you for your years of dedication as Editor of the Reflector. You have carried on a honourable tradition and have done us all proud as an organization. You will be missed in this role. We wish you all the best in your future studies and all that you pursue.

Rick Stankiewicz, PAA President

This is the Thermal Protection System Manufacturing Demonstration Unit developed for NASA's Orion Crew Exploration Vehicle project.
Photo Credit: Boeing Photo - Joe Olmos

It's Not A UFO, So What Is It?

The object in the picture, above, may look extraterrestrial, but it is completely made on Earth. It is a heat shield that will be used for NASA's Orion Crew Exploration Vehicle (CEV). It is designed to protect future astronauts from the extreme heat of re-entry into Earth's atmosphere. Boeing Advanced Systems was awarded the contract to design and build this new heat shield last year.

For more information, go to: http://www.boeing.com/news/releases/2007/q4/071113a_nr.html

Shawna Miles

Inside This Issue

Meet The Original Man From Mars – Perceval Lowell

Mars is big news these days. The red planet is hurdling towards a close rendezvous with Earth on Christmas Eve of 2007. Astronomers using high resolution cameras have just discovered caves on the sides of ancient Martian volcanoes. The Phoenix Lander is on its way to Mars to "dig" for water. Plus, the two Rovers Opportunity and Spirit are back in action having survived a global Martian dust storm. But first let's jump in the Way-Back machine and meet the man who focused the world's attention on Mars. The year is 1855 and the child is Perceval Lowell.

Lowell had the good fortune to be born into an immensely wealthy Boston family. This allowed him to lead an advantaged life and he made the most of every chance it afforded him. Astronomy captured young Perceval Lowell's imagination. This, combined with his math skills, put him on a course for the stars and planet Mars.

At the time the Panama Canal was just being completed. And coincidentally, an Italian Astronomer named Giovanni Schiaparelli had seen some unusual surface detail on Mars which he called *canali*, which in Italian means grooves. In English *canali* became canals – possible evidence of a civilization trying to survive on a dry and dying planet.

Perceval Lowell and the Observatory refractor. He published 3 books on Mars and many articles. A British astronomer called him the world expert on Mars. Our dream of life on Mars continues, only now we're there.

Such speculation ran high from the 1800's through to the late 1950's. Remember, Venus was thought to be a lush jungle by many of the most prominent of astronomers of the day. At one point, all of the planets were thought to be inhabited. Lowell was, as were many others, keen to learn of these distant civilizations.

Lowell's pursuit led him to establish an observatory beneath the dark, stable skies of Flagstaff, Arizona in 1895. Additionally, he financed an expedition, complete with a 7-ton Alvan Clark telescope, to South American where Mars would be high in the sky and better for observing in 1907. It was a year for Mars to make a close approach to Earth, and Lowell was excited by the prospect of using photography to capture images of the canals during this prime opportunity. Unfortunately, the photographs were inconclusive, so the debate continued up to and past Lowell's death in 1920.

Today we can thank Lowell for inspiring a generation of astronomers to continue the search. Such great names as Carl Sagan, Timothy Ferris and Neil deGrasse Tyson might not have studied astronomy were it not for the lure of discovering another civilization.

Lowell Observatory is now a national landmark and the addition of modern facilities continues its usefulness. Built at Lowell's personal expense of $20,000 in 1895, it is where Clyde Tombaugh discovered Pluto in 1930 and Vesto Slipher first discovered that our universe was expanding. Later Lowell Observatory also played an important role in determining landing locations for the Apollo missions to the Moon.

Lowell may have been wrong about life on Mars, but we're still not sure. So the search continues – on Mars with equipment Perceval Lowell could never dream of.

John Crossen
Johnstargazer@explornet.com

Forget The Stars And Planets, Its Comet And Satellite Time

As I write this article, Comet P17 Holmes has brightened over 1 million fold. Overnight it has burst upon the night sky. The comet went from magnitude 17, visible only in the largest telescopes, to magnitude 2.5 or naked eye visibility in the course of an evening.

Comet Holmes isn't a newcomer to the night sky. It was discovered in 1892 by the English astronomer Edwin Holmes. Not surprisingly, he discovered it during one of the comet's periodic (and very dramatic) brightening episodes.

Comets can frequently leap magnitudes in brightness as they approach the Sun thanks to the increased solar heat that melts these huge clumps of dirt and ice. When the eruption occurs, material is blown off the comet so that it brightens considerably.

Comet Holmes' dust cloud is now greater than the diameter of the Sun , which is nearly 1.4 million km across. Please remember, we're talking about an expanding dust cloud not a solid object with mass. The comet itself (called the nucleus) is only 3.2 km in diameter.

At the moment Comet P17 Holmes is traveling through the constellation Perseus. It's about 30º up from the horizon, above and to the right of the bright star Capella. Look just after sunset. When I spotted it there was a near full Moon to contend with, but the comet was still visible without a telescope. One unique thing about Comet Holmes is the fact that it hasn't sprouted a tail – yet. So look for a star near or in Perseus that's blurry.

I can't say where it will be or if it will be visible by the time you read this, but it should still be worth a try. The comet has brightened before, only to drop three magnitudes during the following week. At the moment no one knows what it will do.

Still, if I hadn't mentioned it, Comet Holmes might just turn out to be the comet of the century, and I certainly wouldn't want anyone to miss that experience.

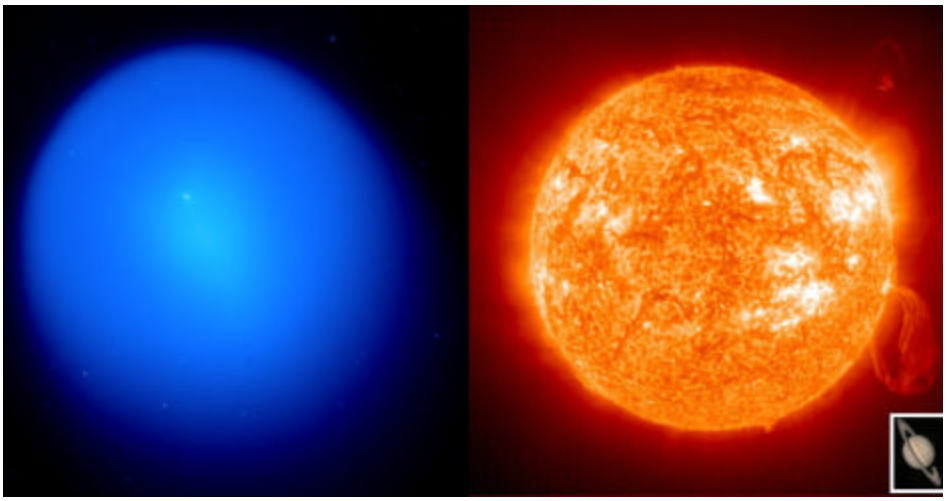
To find Comet Holmes visit www.theskytonight.com or www.spaceweather.com for a downloadable star chart that will show you where to look. For the best view make certain that you get away from city light pollution. If you have a pair of binoculars, take them along. The view of our solar system's new king of circumference is spectacular – and that's an understatement!

More predictable and reliable than comets are satellites. Shuttle Discovery just linked with the International Space Station (ISS), so interest in satellite spotting has jumped again.

My favorite website for satellite predictions is www.heavens-above.com . This site gives you a ten day forecast for satellites passing over. In addition to the time of the pass, you'll also receive the predicted altitude above the horizon, the direction, brightness and duration of the satellite's journey across the night sky. All of which makes it easier to know where to look to spot the satellite.

You have to register and sign in, but that's because Heavens Above keep your latitude and longitude on file. If you don't know you co-ordinates, just pick a nearby city from the list supplied. Close counts. Once they have your co-ordinates, they can tell you what's up in your neck of the woods. Plus you have access to ISS, Hubble, Iridum events and a bunch more cool stuff than I can mention here. But best of all, it's free.

John Crossen
Johnstargazer@explornet.com



This photograph of Comet Holmes was taken by the 3.6 meter Canada France Telescope in Hawaii. The tiny white speck at the centre is the comet. The cloud of ejected material surrounding it is more than 1.4 million km across. For comparison, a photo of the Sun is shown next to it.

Art And Astronomy (PAA-Nov.02/07)

Our previous monthly PAA meeting (Nov.02.07) was well attended and for good reason. Our guest presentation was our very own Vice President, Robert Fisher. They say that "beauty is in the eye of the beholder" and a beauty it was. Robert had something for everyone this evening. I am sure no one was disappointed in what they saw and heard. It was a veritable smorgasbord of the arts. Robert had taken a "staged" approach to his presentation. There were six stages to be exact.

Continued...

The Ceres (pronounced "series") Society

Currently, a theoretical website, but one that could be launched in time to catch-up with the New Horizons probe headed for Ceres as we speak. Robert showed us pages of what looked like an actual website for those interested in Ceres and all things Ceres (seriously). He has developed a logo and even introduced the concept of Ceres merchandise. By the end of his presentation there were some of us that wanted to know where to sign-up to belong to this "society". There is real promise in this concept. Robert, be sure to let the PAA be the first to know if you even "launch" this site. My curiosity has been piqued. I have never been interested in asteroids (minor planets) before, but I am now.

Ceres Vistas

Robert then showed us some original artwork of possible (though theoretical) Ceres landscapes. By using computer software and his imagination through other mediums, we were treated to an array of foreign landscapes that were reminiscent of our Moon, yet much cooler. The indications of ice and snowscapes had a feeling of a Mars polar ice cap.

Stellar Visions

This segment was a true multi-media display of Robert's impressions of Messier Objects. From finger-painting to pastels, this unique and somewhat impressionistic rendition of some of the famous Messiers Objects was a refreshing look at celestial objects we are only used to seeing in photographs. This mixture of images was anything but what we were used to seeing. This added to the uniqueness of the show. You actually had to "look" at the image, to understand it from the eye of its creator.

Venus Transits the Sun

From a hands-on art form in the previous segment to a photographic story, Robert utilized images from his viewpoint on the day of the previous Transit of Venus (June 8, 2004). In photos that he took that historic morning he used any and all of his images. Admittedly, many of the images were not necessarily in focus or what you would expect, but the hints of the solar disk in the telescope and the ghostly impressions of what happened that day was very inspiring. I would have never thought to keep the sort of images that Robert utilized in this presentation, but I will re-think my delete practices in the future. All too often we are quick to discard images that are not "perfect". We don't stop to think of their value as art or how they may still have captured the feeling or the total experience. Remember, you get another chance on June 6, 2012 to see the next transit of Venus. Thought provoking indeed!

IT IS, is it?

The "Internet game of intrigue" was revealed in this segment. For those that like a challenge, like a game of Clue, this game is for you. Robert ran us through the various characters in the game and how they fit into the overarching plot of the NASA cover-up of Mars images that have been leaked on to the Internet. Yet again, we are left thinking about what we are presented with on the screen. Could such things actually be happening? Yet another example of Robert's creativity and I could not help but think that he was using us to "test" his ideas for their actual production. I think he is on to something here.

Original Score to Transit

The world premiere of Robert's own musical score inspired by the transit of Venus. He and a few fellow musicians perform an instrumental arrangement of about 8 minutes in length (original is longer I believe). Robert wrote this score and even played keyboard throughout. Yet another impressionistic piece, but artistic nonetheless. I found myself thinking of some classic "Fripp and Eno" cuts that would have blended nicely with what we heard this evening. All that is left is to put some images to this musical score and we have some "art and an exhibition". Maybe we will be treated to this in the future?

I for one, look forward to future works by our resident astro-artist. Robert, keep the creativity flowing.

Rick Stankiewicz
stankiewiczr@nexicom.net

An Affordable Zoom Eyepiece That Really Works

You would think that everyone would want to have a zoom eyepiece. The ability to change between several magnifications without having to swap eyepieces seems to be a logical step in the development of the hobby. Unfortunately, zoom eyepieces have often gotten a bad rap. Many experts in the astronomy hobby often dismiss them as being either an un-necessary accessory or being an over-priced and poorly designed addition to your battery of eyepieces. In the past, to get a real good one, it has been necessary to part with some serious dollars as good Televue zoom eyepieces start at over $200 and really good Pentax models are over $400. So, despite the bad rap, zoom eyepieces have been out of reach for many amateur astronomers. Not any longer, however, as an affordable zoom eyepiece has come on the market that does a fairly creditable job.

Seben, an optics company working out of Germany, has recently put on the market a zoom eyepiece that goes from 8 mm all the way up to 24 mm in a smooth progression (rather than click-stops along the way). It boasts optics that are really quite good and produce images that are extremely crisp. It is well worth the investment of just under $75 US (including shipping) which, with the value of the Canadian dollar today, makes it an even greater bargain.

Continued...

This eyepiece from Seben goes from 8mm all the way up to 24mm in a smooth progression.

Presently, this eyepiece is currently only available through E-Bay. But, if you're looking for an accessory that will stay with you for years to come, or simply wanting something for Christmas to round out your stable of accessories, this could fill the bill, quite nicely.

Mark Coady
mark.coady@sympatico.ca

Mars, Meteors And The Moon Are December's Targets

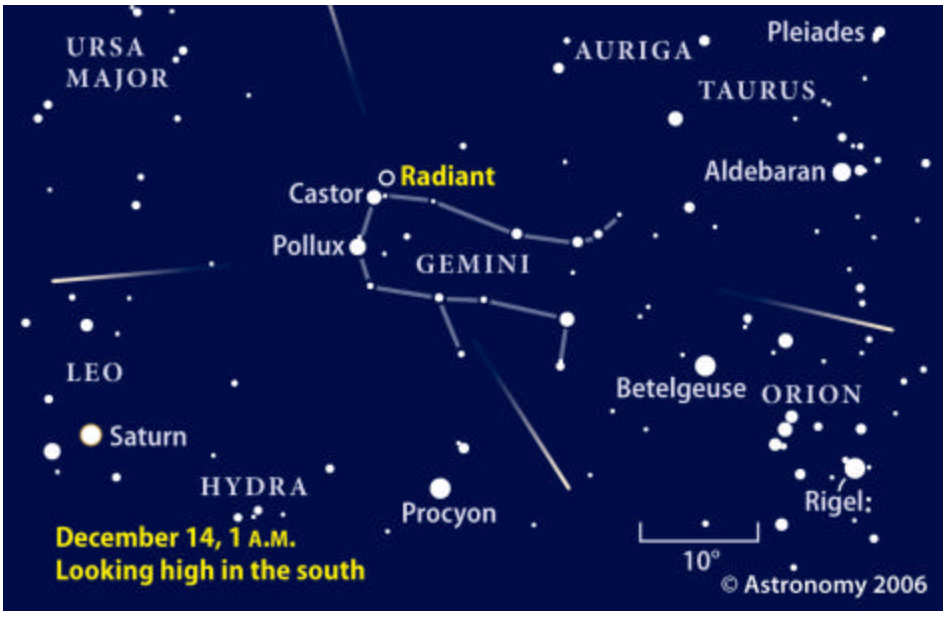
Approximately every 26 months Mars makes a close approach to Earth. This year's planetary pairing takes place the night of December 19th. On that night Mars will be just 88 million km away. Even without a telescope, Mars will be a celestial stand out in the night sky. Look east and up 45 degrees above the horizon about 8:00 in the evening. Mars will be shining big and bright with a distinct reddish tint. If you know your constellations, Mars is in Gemini, the twins.

On the nights of December 13, 14, 15 the Geminid Meteor Shower takes place. Unfortunately for North Americans, our planet will be whistling through the peak of the debris during the mid-day hours. So we should look for increased meteor activity on the night of December 13/14. The Moon will just be approaching first quarter phase, so it shouldn't be a factor in drowning the shower in Moon glare. All you need to observe them is a comfortable chair, warm clothes and a big pot of coffee. A nap in the afternoon or early evening is also recommended. Look east and up towards bright Mars.

The Moon also comes out to play with the stars in December. In this particular instance it will be a close conjunction with the Seven Sisters of the Pleiades. The conjunction will have the nearly full Moon making a close pass at the girls on the night of December 21st. It should make for a beautiful sight – no telescopes required.

Here's more of what December holds for you warm-blooded neck-benders:

All of the winter constellations are up at sunset. Orion, Auriga, Gemini, The Pleiades and Taurus each present targets for naked-eye gazers or those with binocs.



This 2006 chart shows Gemini and the radiant for the meteor shower. Ignore the time directions shown. Saturn will not be visible, but Mars will be just above Gemini. Courtesy of Astronomy Magazine.

In Orion, the Orion Nebula appears as a misty patch in the handle of the sword that hangs from Orion's belt. This nebula is a star-birthing area and the HST has photographed proto-planets forming around one of the new-born stars.

Auriga and Gemini both are home to some beautiful star clusters. In Gemini observers can view M36, M37 and M38. In Gemini, M35 is the star attraction. All are open star clusters and are visible in binoculars as faint fuzzy patches.

To find Taurus, follow a line through Orion's belt up and to the right. The V-shaped grouping of stars represents the bull's horns. The bright star Aldebaran anchors the constellation. Above it and to the right is the large open cluster called The Hyades.

Continuing on a line up from Orion's belt will bring you to the Pleiades. Also known as the Seven Sisters, this beautiful cluster appears as a misty patch about the size of your thumbnail at arm's length. All Seven of the Sisters are naked-eye visible, but you'll have to have good vision. Binoculars deliver a stunning view of this grouping.

Lost in space? I recommend a copy of Terence Dickinson's NightWatch or the latest issue of SkyNews Magazine. Both are available at Chapters outlet some local book stores. NightWatch costs $29.95 and SkyNews Magazine is a skinny $4.95.

John Crossen
Johnstargazer@explornet.com

Kids 4 Science Gets Bright Young Minds Involved Early

Sometimes astronomy can be a pain in the neck. So, after a week of staring up at Comet Holmes on every clear night, it was time to come back down to Earth. Peterborough Collegiate Vocational School was my landing pad and

Continued...

Meet the Junior Space Rangers from Kids 4 Science Conference in Peterborough. As part of their introduction to astronomy, the kids received SkyNews Magazine, Canada's magazine for astronomy enthusiasts.

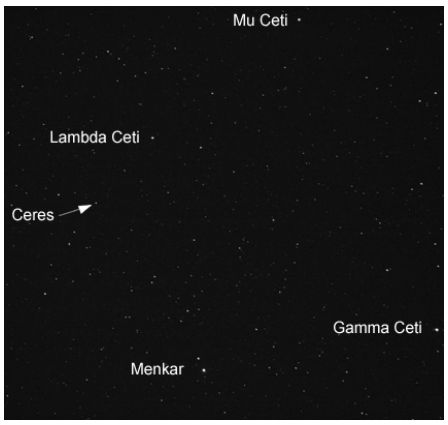
the Kids 4 Science Conference was my passport to a day filled with fun and knowledge. Buckhorn Observatory's portable planetarium was the star (should I say stars?) of the astronomy segment. Other sessions were devoted to chemistry and biology. The children ranged from 2nd graders through to 6th grade and were chaperoned by volunteer high school students. Teachers took their regular Saturday off, and spent it with the kids in special hands-on classes that were a mixture of learning and having fun. BHO's planetarium gave the kids a constellation experience during the afternoon. The younger minds learned about the North Star and how it was important in to the earliest explorers and sailors. Those in the upper grades received the full treatment with additional constellations, tales of a star so big it would swallow up all the inner planets of our solar system, and a slide show that took them from the Sun out to a galaxy that is 2.3 million light years away.

The teachers and student volunteers filled in helping the youngest astronomers build mobiles with stars and planets as well as planispheres to help locate the constellations. All told I had about 75 kids in the astronomy section. I also had a marvelous time and made some new friends with the teachers. My thanks to Alison Armitage for inviting Buckhorn Observatory for the event. My special thanks to Jerome for helping me "tote" all the gear.

John Crossen
Johnstargazer@explornet.com

Seriously Seeking Ceres!

The planets aligned for me this past month, in a "minor" way. I can credit several events happening all at once that allowed me the opportunity to capture the famous minor planet/asteroid (now officially a dwarf planet) "Ceres", to share with you. First off, I finally broke down on November 1st and bought the digital single lense reflex camera (DSLR) I have been wanting for years (Canon Xti). Then, I was truly inspired by Robert Fisher's talk about Ceres (pronounced "series") at our November 2nd meeting of the Peterborough Astronomical Association and all its unique attributes. Finally, the November/December issue of SkyNews magazine arrived and I noticed a segment in Alan Dyer's "Exploring The Night Sky" on how to find Ceres over the next five months. Now with my interest piqued and the right equipment at hand, all I needed was clear skies. On November 11th I got my wish and clear skies were available from my backyard south of Peterborough. Armed with the finder chart from SkyNews (pg.30), I was able to accurately point my DSLR, which I piggyback mounted on my ETX 90 telescope, in the constellation Cetus and start clicking away. The resulting image, below, was some of the fruits of my labour. I captured Earth's closest and smallest (941 km dia.) dwarf planet for posterity. By carefully comparing the final image to a detailed Sky Atlas, it was easy to determine that the 7.3 magnitude object in this image was in fact Ceres. What a great experience, when the planets do align, even if they are dwarf planets.



Rick Stankiewicz
stankiewiczr@nexicom.net

Astronomy Stuff For Christmas And Where To Get It

Astronomy is a very specialized hobby so it just makes sense to shop at an astronomy store. That way you're assured of top quality gear and a knowledgeable staff. They'll help you choose the right gift that's within the bounds of your budget. Here's just a hint of the cornucopia you'll find and what it will cost.

An accurate globe of the Moon will be about a $75 swipe on the debit card. In addition to helping sort out the lunar topography, it looks cool on the desk.

Opt for an advanced set of star charts that are laminated for outdoor use and you'll weight about $50 less when you exit the store. Not ready to slim fast? A simple Messier Card will only trim about $10 off your backside. Also on the low-fat list are Hubble Space Telescope posters, astronomy DVDs and red flashlights to keep the eyes dark-adapted when reading star charts.

A decent set of binoculars will tap your wallet to the tune of $75 to $100. You can spend more, but the law of diminishing returns rules – especially at the novice level.

If your astro-keener has a streak of geek in them, there are a number of astronomy computer programs available. Among the best are Starry Night; The Sky; Earth Centered Universe; and Seeker, a new 3-D tour of the solar system. There are different levels of sophistication in the programs so be prepared to invest from $50 to $250. It helps to know the capabilities of your soon-to-be-gifted astronomer's computer and whether it's a Mac or PC.

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Yet another astronomy-on-disc present that's perfect for the beginner is the DVD Celestial Sphere. It teaches the constellations by season. I have it and can vouch that it works very well. It's available at www.starlight-theatre.net or 1-800-278-2032.

Astronomy club memberships are also great gifts to get beginners off to a turbo-charged start. The Peterborough Astronomical Association annual individual membership costs just $35. Visit www.peterboroughastronomy.com for the details and activities.

The Royal Astronomical Society of Canada also has yearly memberships. Costs vary depending on the location of your local chapter. Visit www.rasc.ca for details.

Here is a listing of local science and astronomy stores a short drive from the Kawarthas. They also have online shopping, so you can give planet Earth the present of a smaller carbon footprint for this year's Christmas shopping spree.

EfstonScience – www.escience.ca or phone 1-888-777-5255

Forget the telescope and get something that can really help a novice neck-bender. They'll learn more and it's one less item for the spring yard sale.

Kendrick Astro Instruments – www.kendickastro.com or phone 1-800-393-5456

Khan Scope Centre – www.khanscope.com or phone 1-800-580-7160

Perceptor – www.perceptor.ca or phone 1-877-452-1610

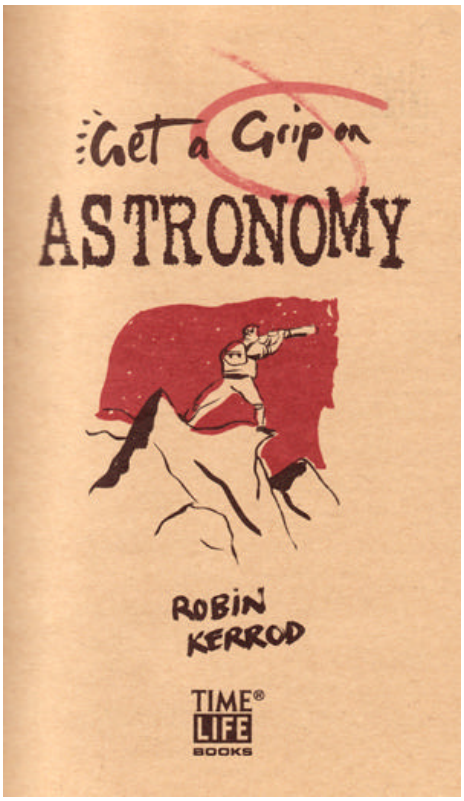
Until we meet again by the backyard telescope remember that the bright red dot you see rising in the east isn't Rudolf's nose, it's the planet Mars.

John Crossen
Johnstargazer@explornet.com

Book Review: Get A Grip On Astronomy: Robin Kerrod (1999)

Over the summer holidays I was looking for a quick read and this book was my answer. At 192 pages, this pocket-sized Time Life book was a great pick-up and put-down throughout my week vacation at the cottage, when not looking for Perseid meteors or injuring myself water-skiing. The eight chapters are indexed, so this book will make a good reference for when I need clear and concise definitions or descriptions of things astronomy related. The author nicely avoids technical terminally, sort of an astronomy for dummies approach (a good one for me).

The content is a little dated, given all the advances in the last eight years for exploration, but the basic content and layout still holds it's own. Speaking of layout, this book is really unique. The order of chapters reads like a novel, in terms of taking you reasonably logically from the foundations of humankind and it's fascination with the heavens, in "How It All Began", to "The Night Sky" and talk of constellations and then "The Stars" and all the different types and why and how they are different. The unique part comes in



how each chapter is structured. It is more like reading a trivia novel (if you are into that sort of thing). I liked it because it was a different approach to a broad subject matter. Each new concept or idea introduced every page or two, had a special box for Key Words that would be talked about on that page, or Key Dates or data boxes to keep the reader focused on the subject at hand. This approach is not for everyone, but when you plan to be putting the book down lots because of brief reading windows, like I had, it worked well. I enjoyed the sense of humour that was shown by the myriad of sketches that accompanied the text.

This book is not for the veteran astronomer, but those getting started and wanting to "get a grip" on all the concepts and ideas involved in this hobby/science, this is a good starter. I plan to get more use of it as a handy reference for when I want to simplify explanations for beginners or kids. This book is true to it's title and does help a novice to "get a grip" on this seemingly complicated subject.

Rick Stankiewicz
stankiewiczr@nexicom.net

NASA Space Place

Going My Way?

Not many endeavors require that you plan the mode of transportation before you even know what it is you are transporting. But weighing the physics and economics of getting any sort of cargo to space is a major part of designing a space mission.

It's one of the first issues that NASA's New Millennium Program (NMP) considers when planning a new mission. NMP has the forward-looking job to identify promising new technologies for space exploration. It then helps to mature the technology so it will be available to space missions of the future. If the technology cannot be tested adequately on Earth, the last part of this process is to actually send the technology into space. With carefully documented test results, future mission planners can confidently incorporate the new technology into their designs.

But where to begin? On call from the start, Linda Herrell is the New Millennium Program Architect. Given a list of proposed technologies, she has the job of figuring out the feasibility of wrapping a mission around them.

"We might be considering six or more technologies, anything from solar panels to imagers to masts for solar sails to more intelligent software. Of those, we may choose four. My job is to answer the question—can the selected technology be transported to and operated in space within the constraints of a low-cost technology validation project?"

Along with the list of possible mission payloads (the technologies), Linda also has a list of spacecraft to put them on, as well as a list of launch vehicle parameters. *All* she has to do is try them out in every possible combination (of which there are thousands) and see what might work.

"Fortunately, we have a software tool to help with this analysis," says Linda. When it comes down to it, her job is primarily to figure out how to get the technologies into space.

"Sometimes, it's like figuring out how to get across town when you don't have your own car. You have to get creative."

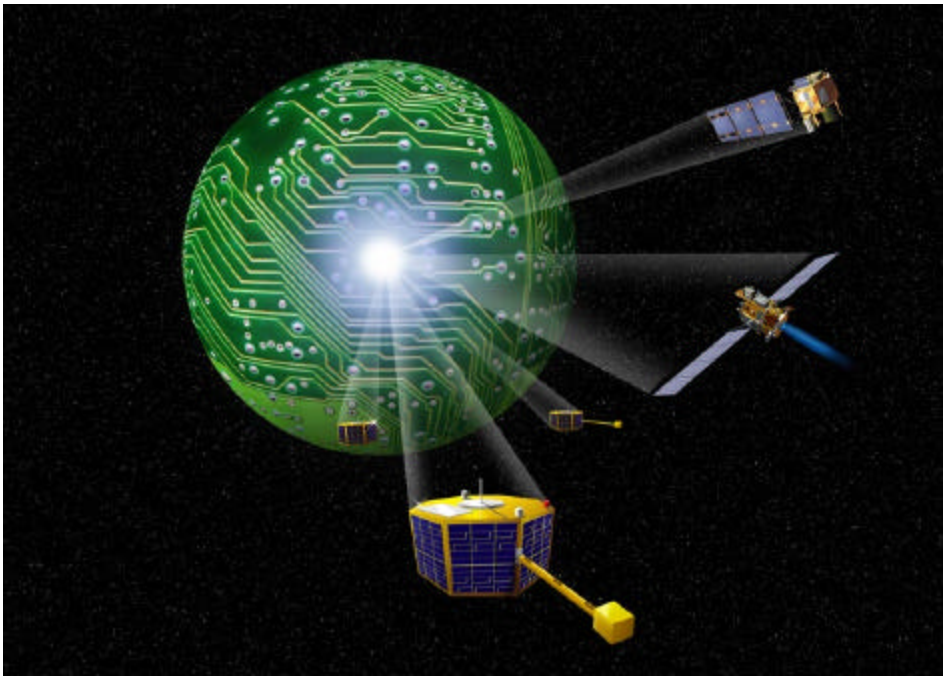
She keeps a database of all possible options, including riding piggyback on another spacecraft, hitching a ride on a launch vehicle as a secondary payload, or sharing a launch vehicle with other NASA, Department of Defense, or even commercial payloads.

Her assessment is but one of a gazillion factors to be considered in planning a mission, but it is indeed one of the very first "details" that forms the foundation for the rest of the mission.

Find out some of the technologies that NMP has already validated or is considering at nmp.nasa.gov/TECHNOLOGY/innovative-tech.html. Kids will enjoy watching Linda's cartoon alter-ego talk about her job at spaceplace.nasa.gov/en/kids/live .

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

By: Diane K. Fisher



NASA's New Millennium Program selects breakthrough technologies that will be of the greatest use to future space and Earth science missions and that are perceived to be risky to the first user.

The Red (Hot?) Planet

Don't let Mars's cold, quiet demeanor fool you. For much of its history, the Red Planet has been a fiery world.

Dozens of volcanoes that dot the planet's surface stand as monuments to the eruptions that once reddened Mars's skies with plumes of glowing lava. But the planet has settled down in its old age, and these volcanoes have been dormant for hundreds of millions of years.

Or have they? Some evidence indicates that lava may have flowed on Mars much more recently. Images of the Martian surface taken by orbiting probes show regions of solidified lava with

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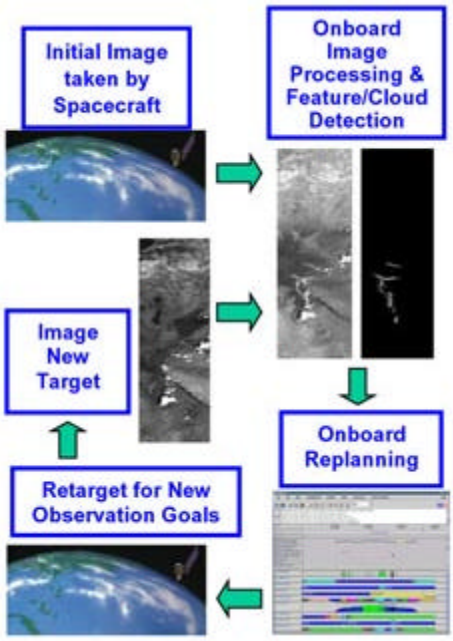


Just as changing cloud patterns on Earth were identified using Earth Observing-1's Advanced Land Imager along with ScienceCraft software, the THEMIS instrument with ScienceCraft on the Mars Odyssey spacecraft can avoid transmitting useless images.

surprisingly few impact craters, suggesting that the volcanic rock is perhaps only a million years old.

If so, could molten lava still occasionally flow on the surface of Mars today?

With the help of some artificial intelligence software, a heat-sensing instrument currently orbiting Mars aboard NASA's Mars Odyssey spacecraft could be just the tool for finding active lava flows.

"Discovering such flows would be a phenomenally exciting scientific finding," says Steve Chien, supervisor of the Artificial Intelligence Group at JPL. For example, volcanic activity could provide a source of heat, thus making it more likely that Martian microbes might be living in the frosty soil.

The instrument, called THEMIS (for Thermal Emission Imaging System), can "see" the heat emissions of the Martian surface in high resolution—each pixel in a THEMIS image represents only 100 meters on the ground. But THEMIS produces about five times more data than it can transmit back to Earth.

Scientists usually know ahead of time which THEMIS data they want to keep, but they can't plan ahead for unexpected events like lava flows. So Chien and his colleagues are customizing artificial intelligence software called ScienceCraft to empower THEMIS to identify important data on its own.

This decision-making ability of the ScienceCraft software was first tested in Earth orbit aboard a satellite called Earth Observing-1 by NASA's New Millennium Program. Earth Observing-1 had already completed its primary mission, and the ScienceCraft experiment was part of the New Millennium Program's Space Technology 6 mission.

On Odyssey, ScienceCraft will look for anomalous hotspots on the cold, night side of Mars and flag that data as important. "Then the satellite can look at it more closely on the next orbit," Chien explains.

Finding lava is considered a long shot, but since THEMIS is on all the time, "it makes sense to look," Chien says. Or better yet, have ScienceCraft look for you—it's the intelligent thing to do.

To learn more about the Autonomous ScienceCraft software and see an animation of how it works, visit http://ase.jpl.nasa.gov .

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 Sky This Month

MERCURY

Mercury disappears from view as it heads toward superior conjunction on December 17. It reappears in the evening sky at the end of the month.

VENUS

The "morning star" has put on a wonderful show, but now Venus declines in altitude.

MARS

Mars reaches opposition on December 24, but its elliptical orbit means that it is actually slightly closer to Earth a few days earlier. This planet is found in Gemini and is up all night.

JUPITER

The largest planet in the solar system is unobservable this month due to its proximity to the Sun in the sky.

SATURN

At west quadrature on the last day of last month, this is a great time to observe telescopically the interplay of shadows between the planet, its rings and its satellites. Saturn rises mid-evening and is found in Leo.

URANUS

Uranus is in Aquarius. It now sets before midnight.

NEPTUNE

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

METEOR SHOWERS

The Geminid Meteor Shower peaks on December 14.

January Brings A New Year And New Celestial Targets

With Comet Holmes bursting into the nightscape of November, the year 2007 certainly ended on a high note. The comet brightened over a million times in a 24-hour period. It then grew from a bright speck to a dot the size of Jupiter and eventually exceeded our Sun in diameter. That's a tough act to follow, but the constellation Orion comes close.

Winter's most famous celestial character is well up in the southeastern sky as evening sets in. By 7:00 p.m. it is visible in its entirety and within another two hours the famous hunter is in prime position for viewing with a telescope or binoculars.

Orion's stellar trademark is the string of three bright stars that make up the great hunter's belt. Named Alnilam, Alnitak and Mintaka, the straight row is a standout in the sparse star population of winter's night sky. If it is a clear, dark, moonless night country residents can easily spot the giant Orion Nebula south of Orion's belt. Nothing but your eyes is required find the misty patch.

Often called the Jewel in the handle of Orion's sword, the massive cloud of gas and dust is 1,500 light years from Earth. That's 1,500 times ten trillion if you want it in kilometers. It is also mammoth stellar nursery that would take over 1.5 million years to traverse in today's most powerful rocket.

The Hubble Space Telescope has not only photographed new stars forming in the clouds of stellar dust and gas that comprise the nebula, it has also taken pictures of proto planets forming in the dust rings surrounding these new-born stars.

While you can see this celestial maternity ward naked eye, a pair of binoculars will reveal it as a brilliant molecular hydrogen cloud glowing with the energy of the stars within it. The view through a telescope is one of the few things that rival seeing Saturn in the eyepiece for the first time.

Use Orion's belt as a guide and you can find even more treasures. Follow a nearly straight line through the three belt stars up and to the right and you'll come to a "V" shaped grouping that form the horns of the Bull in the constellation Taurus. Within it is a large loose star cluster called the Hyades Continue upwards and you'll come to a bright misty patch about the size of your thumbnail at arm's length. That's the seven sisters of the Pleiades.

Most people can see five of the seven bright stars that make up this large open cluster. Those with keen vision will pick out all seven. The view through a pair of binoculars is much more stunning even though the girls are 399 light years from Earth.

Those are just three bits of celestial eye candy for hearty astro-nuts ready to bundle up and brave the cold. Next week we'll visit Orion's hunting dog, Canis Major, Gemini, the twins and the constellation Auriga. Until we meet again by the backyard telescope, keep the lights aimed down and the stars up big and bright.

John Crossen
Johnstargazer@explornet.com

Named after the famous hunter of Greco-Roman mythology, the constellation Orion occupies a large chunk of stellar real estate and is easy to find thanks to the three stars that make up its belt. Photo by John Crossen.

NASA Facts

www.nasa.gov

- A geostationary satellite travels at an altitude of approximately 36,000 kilometers (22,000 miles) above the Earth and at a speed of about 11,000 kph (7,000 mph).
- The Dryden Flight Research Center (DFRC) is NASA's center for aeronautical flight research and atmospheric flight operations. DFRC is chartered to research, develop, verify, and transfer advanced aeronautics, space and related technologies. It also serves as a backup landing site for the Space Shuttle and a facility to test and validate design concepts and systems used in development and operation of the Orbiters.

Is Mars The Bad Boy Next Door?

It's no coincidence that lately the articles have been devoted to Mars. For starters we have the new Phoenix Lander headed towards the red planet. It's scheduled for Martian touch-down on May 25, 2008. Then there's the happy fact that the Mars Rovers, Spirit and Opportunity, are back in action having survived a two-month-long Martian dust storm. Yippee for us!

And, as the new Lander races towards Mars, Earth is catching up to the Red Planet thanks to our smaller orbit. Because we have the inside orbital track, we're closing the gap at 35km/s. That means the 2007 close encounter (88 million km) with Mars takes place on the night of December 19th. And on Christmas Eve Mars will rise at sunset and shine brightly as it traverses the sky before setting in the west at dawn.

But Mars isn't all things bright and beautiful. Named for the Roman God of war, it is likely that Mars takes its name from the blood red color of the planet. Even its two moons have sinister sounding monikers. Phoebos is a derivative of phobia. And Demos has its roots in the word demon. They're not exactly names you'd give your new kittens.

Then there's the gremlin of Mars. It's real, both literally and figuratively. Over half the missions the Americans, Russians, and British have sent to Mars have failed. Not counting the Mars Lander that makes only18 successes in 38 attempts. Not a great track record. Hence, NASA has a poster of a cartoon Mars Gremlin on its walls. It's a whimsical reminder not to get too cocky about future Mars missions.

Then there's the portrait painted by Hollywood and the Sci-Fi pulp merchants. There were books involving space travel as far back as the 14th century, but in modern times one need look no further back than H.G. Wells' War of the Worlds. Since then we've had Invaders from Mars, The Angry Red Planet, Devil Woman from Mars, and four remakes of War of the Worlds – two as TV series.

So is Mars the bad boy next door? We'd better hope not. After all, your children and grandchildren could be the first Earthlings to colonize Mars. And that would make their offspring real live Martians!

John Crossen
Johnstargazer@explornet.com

Mars has been the planet of mystery in mythology, books and films. Let's hope this critter isn't on the welcoming committee when the Mars Lander touches down on May 25, 2008. Photo by Slashshot.

Peterborough Astronomical Association

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

Website
www.peterboroughastronomy.com

Email
stankiewiczr@nexicom.net

Club Mailing Address

Rick Stankiewicz
President
Peterborough Astronomical Association
10 Hazel Cres.
R.R.#8
Peterborough, ON
K9J 6X9
(705)295-6158

Stellarium 0.9

A couple of years ago I reviewed freeware astronomy software called "Stellarium" which I felt was quite good, especially considering that it is free. I won't go over that review again as it can be re-read to glean all of its advantages. Suffice it to say that the software is still free but it has been updated and is better than ever.

Two of the improvements are that when the moon is up and washing out the sky it is reflected in the ground cover. Another improvement is that the software comes with a "red screen" display option that helps the observer retain his dark adapted eyes while using a laptop in the field. Go to the following website to download Stellarium:

http://www.stellarium.org

Mark Coady
mark.coady@sympatico.ca

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

Star light, star bright
First star I see tonight
I wish I may, I wish I might.
It's just a satellite

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

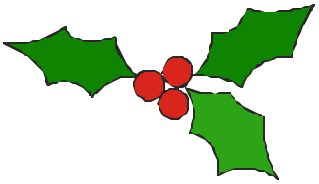
ARTICLES

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:

Shawna Miles
2192 Bass Lake Rd.
Bobcaygeon, ON
K0M 1A0

or via e-mail at:
Shawna.mi@sympatico.ca

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



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

Last Quarter	**November 1, 2007**	**December 1 & 31, 2007**
New Moon	**November 9, 2007**	**December 9, 2007**
First Quarter	**November 17, 2007**	**December 17, 2007**
Full Moon	**November 24, 2007**	**December 23, 2007**