

# The Harvest Moon will fool your eyes and your brain

**H**ow many times have you watched in wonder as the gigantic full moon of autumn crested the horizon? It seems so big. But the amazing truth is that the huge Harvest Moon is playing tricks on your eyes. It's strictly an illusion, and the closer the Moon is to the horizon, the larger it appears. But it really isn't any bigger near the horizon than it's when it's high overhead. To prove it, try this.

As the Full Moon is just peeking over the horizon, hold your hand out at arm's length. Place your index finger on top of the Moon and your thumb beneath it. Now move your hand away from the Moon, but maintain the distance between your index finger and your thumb. The distance between the two will be about the size of an aspirin. But it looked so big! Wait a couple of hours until the Moon is overhead and repeat the procedure. Once again, it's only the diameter of an aspirin. Here's another way to prove that your mischievous mind is playing tricks on you.

Take a photograph of the Moon with standard portrait lens. It duplicates objects as the eye sees them.



**SHOT OF FULL MOON IN THE DESERT.** When the Moon appears this large in a photo, the shot was taken with a powerful telephoto lens at a long distance so that the foreground objects and the Moon are both in focus at infinity and the Moon looks huge.

Now take a look at the image on the LCD screen. You'll be surprised at how small the Moon appears on the screen. But the camera never tells a lie.

Some people maintain that the Moon is closer to Earth when it is near the horizon and gets farther away when it is higher in the sky. The only problem is it's the Earth that's rotating and makes the Moon appear to move across and up the sky. It's not any closer to us near the horizon than it is later in the night when it appears to be over head. The Moon's distance from Earth averages 400,000 km, no matter where it is in the sky.

There are times when the Moon really is closer and appears larger than at other times. That's because the Moon's orbit around Earth is elliptical. The size difference is about 10% between a Full Moon at apogee (farthest from Earth) and perigee (closest to Earth). I've taken photographs of the Full Moon at apogee and perigee and you can see the difference when the photos are side-by-side.

The Harvest Moon earned its name during the days when farmers harvested their crops with horse-drawn vehicles. There were no artificial

# Welcome Back

## PRESIDENT'S MESSAGE

I hope you have had a good summer. As we start up for the balance of our year from our summer hiatus from meetings and newsletters. I am sure this edition of The Reflector will be as good as ever. I hope some new members consider contributing to this valuable asset of our club.

We will need a few more members to step forward to get involved in a committee or two for the coming year, as our club would like to advance the yardsticks on a few fronts, but we all need your willingness to get involved. This fall we need to start making plans for not only our annual Astronomy Day and light pollution abatement programs, but we are considering some special planning for the 2009 "International Year of Astronomy" (IYA), as declared by the United Nations and the International Astronomical Union. If nothing else, let's get more people to look through a telescope eyepiece and into the heavens, it is our natural heritage to be shared by all. The international goal is to have 10 million telescope viewers next year in celebration of the 400th anniversary of when Galileo first looked through a telescope and discovered the wonders of our solar system.

Keep looking up,  
Rick Stankiewicz, President

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## Autumn Thoughts

### EDITORIAL

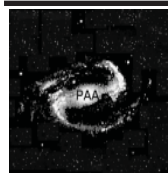
As our wonderfully damp summer winds down we can look forward to the cool evenings of autumn. There are many advantages of stargazing in the fall: earlier nights and less mosquitoes! I've found I prefer this season over spring. The Milky Way arches overhead from eastern to western horizons and is spectacular. The Square of Pegasus and Andromeda are high and brings the Great Andromeda Galaxy into great viewing position. The Summer Triangle while lower, still provides a pleasant sight. And if you are up before morning twilight later in the month, watch for the Zodiacal light.

Since this is our first newsletter since June we have lots of great articles and photos featured. John Crossen continues his delightful stories of the constellations: Sagittarius and Ophiuchus this month. Rick Stankiewicz recounts his summer fishing trip and also tells us how to find the International Space Station as it makes its frequent flights over our fair city. Peterborough seems to be well positioned for exceptional passes as I've witnessed a number myself and photographed as many.

Finally, we have a great NASA article describing Sensor Web 2.0. Some researchers at NASA are working to network the space agency's numerous satellites. The really cool feature here's is that the public will get the opportunity to direct satellites to look at specific areas of the Earth and request maps of the target location. Sort of a Google for Satellites.

So, welcome back and enjoy the September newsletter and hope for clear skies.

**Phillip Chee**  
**Editor, The Reflector**



**Peterborough  
Astronomical  
Association**

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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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## Ophiuchus, the constellation nobody talks about

Perhaps it's because nobody can pronounce his name. Phonetically speaking, *oh-fee-you-cuss* is the name and snake handling's the game. Snake handling! Hum, this guy's occupation may be another reason for his obscurity.

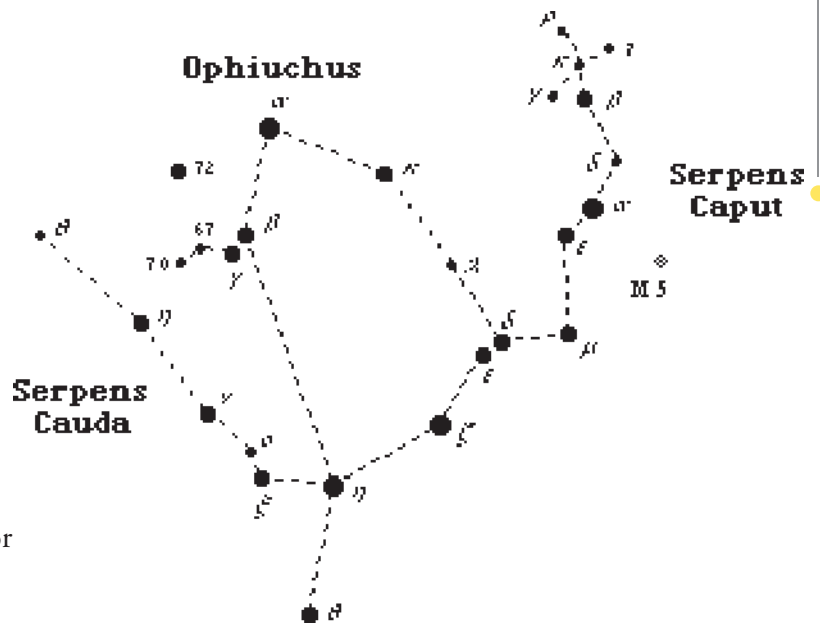
As constellations go, Ophiuchus is one of the celestial boys of summer. And he has a few nifty treasures for those of you with access to binoculars or telescopes. But first here's our boy's bio.

Ophiuchus has been a recognized constellation for about 4,000 years, first by the Greeks, and now worldwide. He is visualized holding a snake stretched out between his extended arms.

The snake, too, is a constellation named Serpens. The tail of Serpens is to your left as you view Ophiuchus and is known as Serpens Cauda. Serpens head is to your right and is referred to as Serpens Caput.

Ophiuchus is yet another name for the Greek god of medicine, Asclepius. Apparently Asclepius saw a snake one day and killed it. To his amazement another snake appeared and using herbs, the new snake brought the ex-snake back to life. Could the first house call in medical history have been made by snake?

Asclepius took it upon himself to learn the medical powers of herbs and eventually learned to raise the dead, thereupon becoming the god of medicine. But in Greek legends you can't become a god without making a few enemies. Asclepius was no exception because Hades, the god of the underworld, feared that he would soon have no new souls to populate his domain. Hades (known as Pluto to the Romans) persuaded Zeus to kill Asclepius with a thunderbolt. Hades's sales pitch to Zeus was that this would convince all humans that



Ophiuchus and Serpens are dim constellations best seen from dark rural skies. Even then you'll need a star chart to help you connect the dots

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## Harvest Moon

lights then, but the bright Full Moon provided enough light to allow them to stretch the harvest day into the early hours of the night. Hence, the term Harvest Moon was born.

Each month has a Full Moon and a name, usually stemming from the days when Moonlight was the only light at night. In addition to the Harvest Moon of September, there are 11 more. October brings the Hunter's Moon. In November we have the Beaver Moon. December heralds the Cold Moon, and January's Full Moon is the Wolf's Moon.

Oh, and what about the Blue Moon? Occasionally there are two Full Moon phases in one month. If the Month begins with a Full Moon and there is another at the end of the month, the second Full Moon is called a Blue Moon. But the Moon doesn't really turn blue. After all, it's made of green cheese!

John Crossen ([johnstargazer@xplornet.com](mailto:johnstargazer@xplornet.com)) also owns Buckhorn Observatory (<http://buckhornobservatory.com>)

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## Is Sagittarius a teapot, a man, a horse, or an archer?

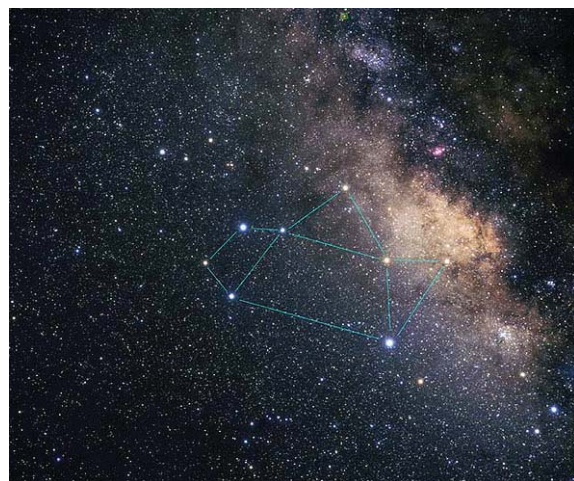
The correct answer is all of the above. According to legend, Sagittarius is a half man, half horse which is known as a centaur. The man half is also an archer with his bow and arrow aimed at Scorpius the scorpion which is just in front of him. The back half is the horse half and we'll let the story end there.

In modern times we have moved away from seeing the classical mythological objects in the night sky. Instead we have singled out the brightest easiest-to-see stars and given them different names. The Big Dipper is a perfect example.

The stars that form our modern-day Dipper are the brightest stars in the constellation Ursa Major or the Great Bear. Perhaps our light-polluted cities have led us to single out only the brightest, more visible stars in the constellations. At any rate, our modern-day Dipper is properly called an asterism, not a constellation. The same goes for the Little Dipper or Ursa Minor, the little bear.

For the same reasons what was once referred to as Sagittarius is now called the Teapot. Once again, stargazers are referring to only the brightest stars in Sagittarius. This also makes the Teapot an asterism. And because you're only looking for the brightest stars, it is much easier to find in the less-than-ideal sky conditions under which many of us do our celestial neck bending.

Sagittarius is the stargazer's pot of gold at the end of a stellar rainbow we call the Milky Way. The summer Milky Way stretches across the sky from the northern horizon down into Sagittarius just above the southern horizon. Sagittarius is home to 17 of the 110 Messier Objects. Best of all, some are visible to the unaided eye and most of the other Messier Objects in the Teapot are visible in handheld binoculars with 7 or 8 power and 40 to 50 mm aperture. Chances are you have a long-forgotten pair in the closet. If so, get them



A good star chart and a dark sky away from city lights are all you need to begin the journey of a lifetime. If you're visiting the Kawarthas from a light polluted urban area, look up to see what you and the family have been missing.

hanging around your neck. Here are just some of the highlights in the celestial pot of gold that are waiting.

Under very dark skies, the Lagoon Nebula (M8) is visible to the naked eye. Pick up a pair of 7x50 binoculars and you'll discover its neighbour, the Trifid Nebula (M20).

Just above the lid of the teapot is the globular star cluster M28. A bit to the left and up is the naked-eye target, globular star cluster M22. It is spectacular in a telescope.

Other binocular targets include M22, a giant star cloud. Moving further up the Milky Way, you will come to M17, the Omega or Swan Nebula. Raise your binocs up a bit more and you're looking at M16, the Eagle Nebula. The reason for all these stellar fireworks is the fact that you're looking towards the centre of our galaxy when you look towards Sagittarius. The exact galactic centre is just off the tip of the Teapot's spout.

Until we meet again by the backyard telescope, pick up a copy of Terry Dickinson's books *NightWatch* or *Summer Stargazing*. Then get out and under the stars.

*John Crossen*

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## Snake charmer

they were indeed mortal and must die someday. Gods have been immortal and funeral directors rejoicing ever since.

Zeus did the evil deed, but he must have had a guilty conscience because he then raised Asclepius up to the heavens where the slain doctor became the constellation Ophiuchus. This is also likely where the two snakes in the medical symbol originated.

Ophiuchus is located directly above Scorpius. The good doctor and his snake buddy, Serpens, are comprised of fairly dim stars. If you live in a light-polluted city your chances of spotting them are poor. But, up at the cottage or on a farm, Ophiuchus is quite visible, though it will take a bit of scanning your star chart to connect the dots.

Binocular observers can enjoy the challenge of finding three globular star clusters within Ophiuchus. Bearing the letter M for Charles Messier, the comet hunter who first listed them, they are: M9, M10 and M12. They will appear as small fuzzy stars that won't come to focus. In an 8-inch aperture telescope, these "fuzzy-out-of-focus" stars become beautiful balls of stars. Some contain as many as 1 million distant Suns. The stars in some globular clusters can be dated back to within three billion years of the Big Bang.

Until we meet again by the backyard telescope, keep looking up.

*John Crossen*



## The Sky this Month

**Mercury** reaches greatest elongation east ( $27^\circ$ ) on the 11th and inferior conjunction on October 11th.

**Venus** forms an evening trio with Mercury and Mars and comes into conjunction on the 11th and 12th. At our latitude Mercury will set just over 10 minutes after civil twilight ends on the 11th and Venus sets 10 minutes before nautical twilight ends. A flat horizon will be necessary to get a good view.

**Mars** is in Virgo and will form a trio with Mercury and Venus during the first half of September. On the 11th Venus will be  $0.3^\circ$  north of Mars.

**Jupiter** is still in retrograde motion at the beginning of the month, is stationary on the 8th, then begins direct eastward motion.

**Saturn** in conjunction with the sun on the 4th and reappears at dawn during the last 10 days of the month and rises before astronomical twilight at the end of the month.

**Moon** at apogee on the 15th. The Moon will be  $1^\circ$  north of the Pleiades on the 20th.

**Equinox** arrives at 11:45am on the 22nd.

**Zodiacal light** visible in the east before morning twilight from the 27th for the next two weeks.

# Astronomical Fishing

This past June I went on a fishing trip that some people would say I was crazy to take. Everyone knows that fish is cheaper from the super mart. To anglers who are looking for extraordinary experiences along the way, my friends and I annually have such trips. This year was no different, other than we drove 1,800 km (one-way) just to get to our starting point. We went from Peterborough to Hudson (north of Sioux Lookout) in order to rent a houseboat for a week and fish on Lac Seul. Lac Seul is in northwestern Ontario and happens to be the second largest inland body of water wholly within this province's borders. Yes, seven guys on a 50-foot houseboat for a week and we are all still friends. The houseboat simply allowed us to move around the lake and to fish and explore different territory during the week. We did have three other smaller boats in tow for actually fishing during the day. If you like walleye and northern pike fishing, there was no lack of opportunities on Lac Seul. We caught lots of these and other species. Over the whole trip we saw white-tailed deer (nearly hit one), moose, black bear and woodland caribou. Bald eagles are as common in the northwest as ospreys are around Peterborough.

I will have to show you at least one picture of me with a fish, as some form of proof that I did angle (see attached) and caught something.



However, there was more to this trip than angling. I only had my tripod and camera, but I was treated to several moonrises in a



**Moonrise on July 19th brings to mind Hallowe'en.**

row and right around the full phase too (June 18th). The attached images show you the first class view I had from our houseboat in a bay of calm water and the typically lower northern tree line on the horizon. Look carefully though, as the bright "star" on the left, shining at about  $-2.6$  magnitude, is actually the planet Jupiter. It was an awesome sight to see these two celestial objects beside each other, but to catch their reflection on the surface of the lake as well, just added to the experience. Included here are images from two different evenings (18th & 19th). At close to midnight on the 19th, the rising Moon made the horizon look more like Halloween that mid-June, but Jupiter was right there between the clouds and not to be missed.

Then as the week came to a close, my last evening on Lac Seul did not disappoint me either. As the Sun was getting ready to set in the

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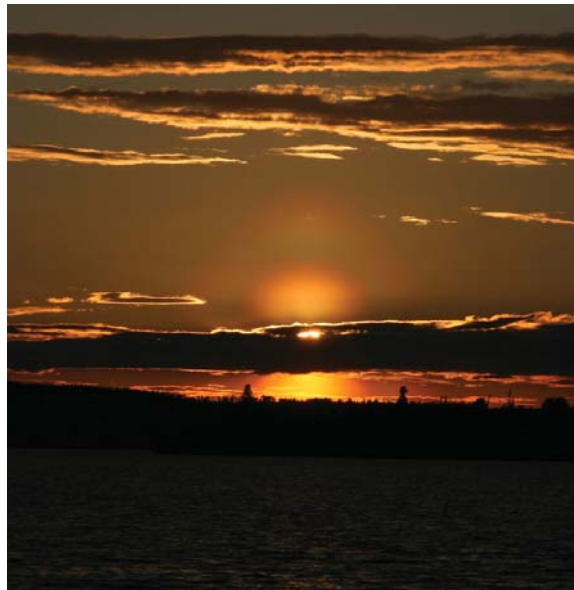
A beautiful moonrise on July 18th with a bright magnitude  $-2.6$  Jupiter to the left.

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western horizon, a thin band of cloud blocked its glare and allowed the clear sky above to reflect a strange solar corona. I had never witnessed anything like it. I have seen lots of solar pillars and halos before, but this was not a “spike of light” or a ring, but rather an odd double, oblong shaped, iridescent glow. The attached image reflects what I saw that evening. I have subsequently determined that what I saw was a “pollen corona”. June is the best time of year to witness this atmospheric phenomenon, as many of the trees release their pollen grains to the winds and they fill the water and atmosphere. They are so small that you don’t even notice them, but as in this case, the Sun’s diffraction of light can produce these incredible coronal “rings”. As usual, you just have to be looking for them.

The next day my journey home began, and 34 hours and 1,800 km later, I was home south of Peterborough, without even having left my province! Where to next year? Who knows, it might depend on where the fish are biting.

*Keep looking up,  
Rick Stankiewicz*



A pollen corona decorates a lovely sunset.

## Moon Phases

First Quarter	10:04 am	September 7
Full Moon	5:13 am	September 15
Last Quarter	1:04 am	September 22
New Moon	4:12 am	September 29

One of the advantages of single lens reflex (SLR) cameras is the ability to switch lenses to suit a particular photographic situation. One of my favourite lenses is the Nikkor 10.5mm Fisheye. You can achieve an incredible 180° angle of view. The other aspect I love about this lens is the sense of the curvature of the sky that you don't get with a normal lens. – p.c.



***Via Lactea.*** The early summer Milky Way is splendidly arrayed across the sky and the fishy lens gives great emphasis to its extent.



***The ISS crosses the Milky Way and disappears in Cygnus.*** With a very short focal length of 10.5mm a fisheye lens allows you to take long exposures before star trailing is noticeably visible. This is a 90-second exposure and makes an International Space Station fly over even more dramatic.

# PHOTO GALLERY



***Zodiacal light with Perseid.*** A very wide angle of view is required to show the relationship of the Zodiacal light, or False Dawn, in relation to horizon and sky.



***Nautical twilight.*** The hour before actual sunrise often displays a wonderful range of hues as the sun's scattered light narrows into focus along the blue wavelength.

Photos by Phillip Chee

# It's autumn and time for some stellar house cleaning



**The Pleiades. Meet autumn's ladies of the night – the Seven Sisters. The photo shows what they would look like in a pair of binoculars. Photo by John Crossen.**

**A**s the seasons change, so do the constellations. That's because we're doing our stargazing from a different spot in our orbit around the Sun. Now, when the Earth rotates away from the Sun and night falls, we see some new characters in our night sky. So as we sweep summer's constellations into the west, look to the east for some new faces.

Most familiar are the Seven Sisters of the Pleiades. The girls are rising about 11:00 pm in early September, then two hours earlier each month as the year progresses. To the unaided eye the Pleiades appears as a misty spot about the size of your thumbnail at arm's length. On a crisp clear autumn night all seven of the stars are visible to those with sharp eyes. And in a pair of binoculars, the girls of autumn are spectacular. Happily they are with us from autumn through the winter, so you'll have plenty of chances to catch them.

The constellation Auriga (*oh-Rye-gah*) is also rising in the east. Known in mythology as the Charioteer, Auriga's most distinctive feature is the bright star Capella. I call this star my UFO because when it is near the horizon in early autumn it flickers red, green and white

as its light gets bounced around by our atmosphere. Scarcely a year goes by when I don't get a couple of phone calls about "this weird thing" that's changing colours and just hangs in the sky.

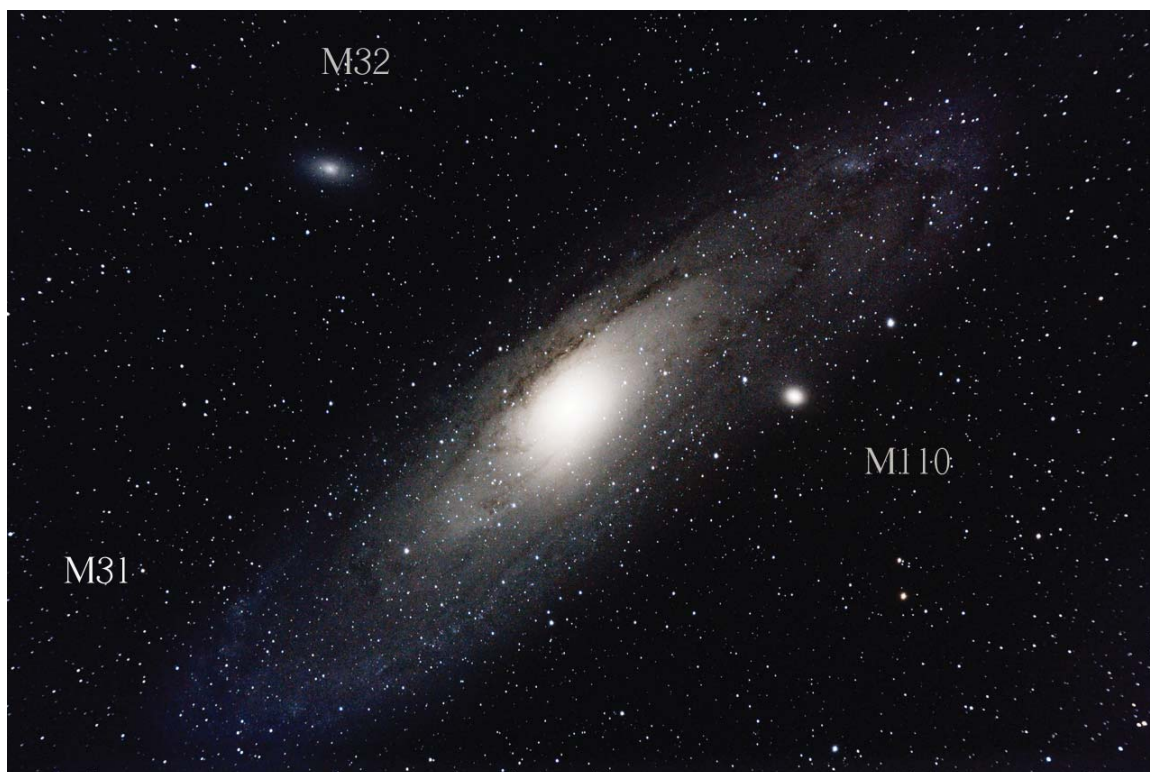
One of the nice things about autumn's arrival is the fact that night time comes earlier. That means you don't have to stay up late to get a little stargazing in. So mid-week neck bending won't leave you blurry-eyed the following morning. Early darkness also means you can bid farewell to summer's favourites, Sagittarius and Scorpius, while you welcome in the Autumn's newcomers to the night sky.

All through September and October, Jupiter will continue to rule the southern and then the southwestern sky. Aside from the Moon, it will be the brightest object in the heavens.

If you have a pair of 10x50 binoculars and can hold them very steady (a tripod mount is best) you will see what are called the Galilean Moons. These are the same four moons that Galileo saw in 1610 when he turned his primitive telescope towards the giant planet. As they orbit Jupiter, their positions change from night to night, so the view changes regularly. And on nights when one or more of the moons is passing behind or in front of the planet you may only see three or two moons. To find out who's who during the dance around Jupiter, pick up a copy of *SkyNews* and check out the Star Chart section. In addition to a good star chart, it also tells you what's up on different nights.

So welcome to beautiful, bug-free autumn. The cool, crisp nights are a welcome change... and so is the change in celestial characters. Next week we'll review a celestial soap opera that was even made into a movie. Until then, keep your lights aimed down and the stars up big and bright.

*John Crossen*



The Great Andromeda Galaxy. Even a telescope can't show you the Andromeda Galaxy as clearly as this digital image taken by Gord Rife of Schomberg, Ontario with a Canon Digital SLR camera. Note the companion galaxies, M110 & M31.

## How far can you see?

**A**long with the approach of autumn, September also heralds the Andromeda galaxy's arrival in the night sky. I love this time of year because it gives me the opportunity to show people that they can actually eyeball a distant galaxy — no telescope required. Granted, it helps to have someone point out where it is with a laser pointer that's specially designed for astronomy. Nonetheless, it gives me a lot of pleasure when I finally hear the observer exclaim, "Hey I can see it. I can really see it."

Following that moment of astronomical epiphany the binoculars come out and Andromeda unfolds to the viewer's eyes like a delicate yellow bloom in the heavens. Next up is a low power telescope view. Andromeda is so large that anything over 25 power will clip the tips off its outer dust lanes. The wider view also lets you scope out its two companion galaxies. That's right, three for the price of one.

Aside from being one of the more stunning sights visible from planet Earth, the Andromeda galaxy also racks up some fascinating numbers. Keep in mind the fact that one light year is a measure of distance that stretches out to 10 billion kilometers. Let's see, 10 billion times 2.3 million...hum better pack a snack if you're heading out for our star city neighbour. Andromeda's distance from Earth not only stretches the imagination, but the blackboard in Professor Know-it-all's class room.

If size really does matter, the galaxy is 150,000 light years across. That means that the light from the far side of the galaxy takes 150,000 years longer to reach your eyes than the light from the near side. So you'll have to add an extra 150,000 to the 2.3 million years the near side light took to reach your eyes.

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# The International Space Station Flies Over Peterborough — Regularly!

**M**any citizens of the Peterborough area (and around the world for that matter) are not aware that the International Space Station (ISS) can be seen flying overhead on many evenings throughout the year. You don't need a telescope or any special optical aids of any kind to see it either. You just have to know when and where to look. A clear, unobstructed view and away from major sources of light pollution also help.

The trick is in knowing when and where to look and what you are looking for. It is easier than you may think. The best website I have found for tracking the ISS is [www.heavens-above.com](http://www.heavens-above.com). On the "Home" page under the "Configuration" section select "Create new user account". You will need to include the coordinates for Peterborough (Latitude 44.3 north and Longitude -78.3 west). Subsequently you can then use the "Registered user login" link. Click on the ISS link and you will

be given the details required for spotting the ISS over the next week or so (provided it is passing this way).

Currently, the ISS is scheduled to be visible from the Peterborough area every evening for the next four days at least. The chart that Heavens Above gives you includes the "magnitude" or brightness of the ISS when it passes by (the smaller the number the brighter it will appear), the "Time" it appear in the sky down to the second (make sure your watch is accurately telling time), the "Attitude" above the horizon in degrees when it will first appear and the "Azimuth" or the direction it will be traveling from. A basic compass is helpful in getting pointed in the right direction. The rest of the chart tells you where the ISS will be tracking to as it reaches it's maximum height in the sky and then where and at what point it will disappear from view. This all assumes you

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Photo by Phillip Chee. This photo of an ISS fly over was taken on the evening of July 16, 2007 with Fujichrome Sensia 400 film. This was also during the STS-117 Space Shuttle Atlantis mission.

# ISS and Cedar Knoll Observatory

The International Space Station (ISS) has been making lots of passes over the Peterborough (Ontario, Canada) area lately (this summer), sometimes two or three passes per evening. One such night was Friday, July 25th 2008 and the attached image shows a 30 second segment of a 4 minute pass by the ISS at 23:08 EDST. This image is looking due north, as Polaris is the brightest star above the main dome at the Cedar Knoll Observatory, a private observatory just north and west of Peterborough. This image captures the mid-way point of the ISS passing (17 degrees above the horizon) as it traversed from 10 degrees northwest to 11 degrees northeast, as it arced across the northern sky. It reached a maximum magnitude of 0.6 on this particular passing.

The 10 ft. (3m) dome at Cedar Knoll was illuminated for the few seconds with a red light to help it stand out on this Moonless evening. I used a tripod mounted Canon 400D camera and Sigma 17-70mm lens set at 17mm and ISO 800,  $f/2.8$  for 30 seconds.

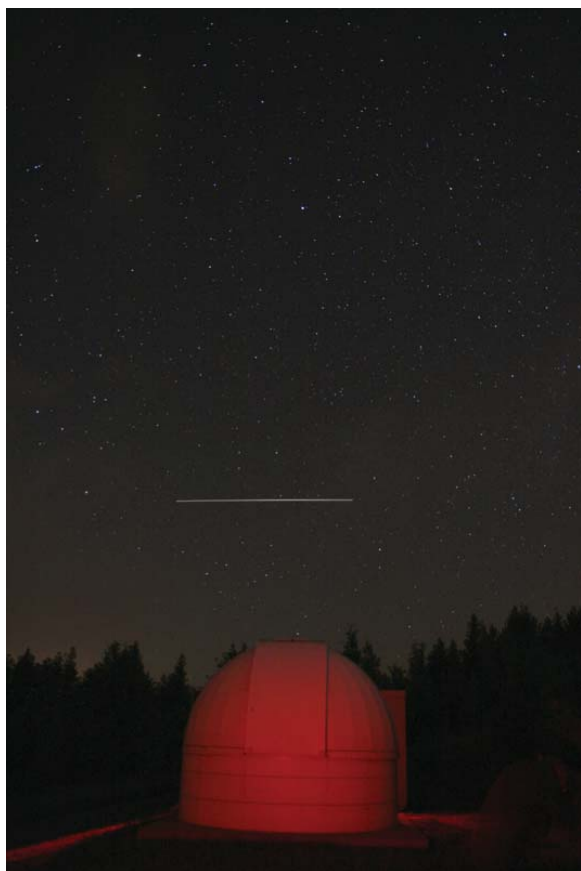


Photo by Rick Stankiewicz

Why not give it a try? It is easy to catch a view of the ISS as it circles the Earth in one of its continuous orbits. Here are a few facts to consider; the ISS is orbiting about 340 km above the earth, at a speed of approximately 28,000 km/h, so it takes it about 91 minutes to circle the earth. It is always on the move and rarely is seen on the same trajectory twice. The ISS was launched in 1998 is now the size of a football field! For more details on the ISS see: [http://en.wikipedia.org/wiki/International\\_Space\\_Station](http://en.wikipedia.org/wiki/International_Space_Station)

*Rick Stankiewicz*

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## Andromeda

Two point three million light years may seem like an incredible distance, but most galaxies visible in a backyard telescope are hundreds of millions of light years away. In fact Andromeda's relatively close proximity to Earth makes it a member of our Local Group of galaxies. The scope of "local" just got a lot bigger didn't it?

Compared to our Milky Way galaxy, Andromeda is our big brother. We're just 90,000 light years across, soaking wet. Andromeda's size advantage over the Milky Way won't be a factor for about another 2 billion years. That's when we're due for a galactic smack-down with Andromeda.

Actually there won't be many smacks because stars are so far apart that galaxies don't collide, but pass through each other like the splayed fingers of your hands when you put them together. Astronomers call it an "interaction" which is much a more accurate way of describing what actually happens. Gravity is the major factor. It's the force that will tear material away from the Milky Way and add it to Andromeda's already larger bulk. But that's a story for another article.

Next time I enter Dr. Heyden's office and he asks me how my eyesight is I'll just tell him I can see 2.3 million light years...and smile.

*John Crossen*

# Ahoy, mate, there's water on Mars and lakes on Titan

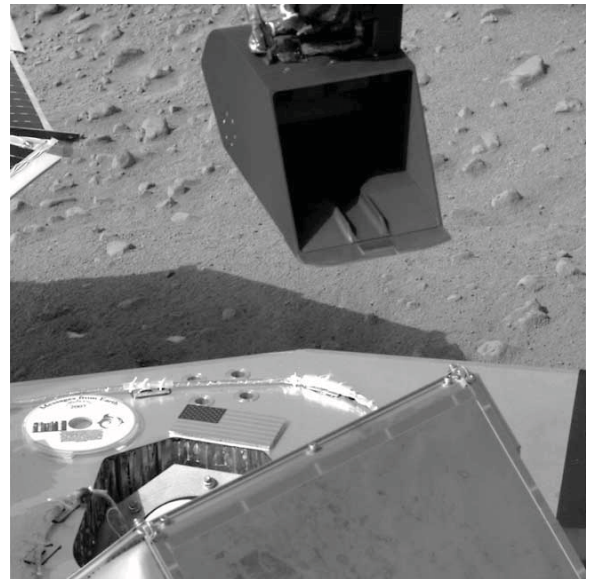
**O**n August 1, 2008 the Phoenix Mars Lander scooped up a sample of the Martian soil at its landing site. The on-board lab analyzed the sample and declared that water was present in the soil. It did so by heating the sample and then analyzing it for water vapors being given off. Called the Thermal and Evolved-Gas Analyzer (TEGA), the device is the responsibility of William Boynton of the University of Arizona. As the lead scientist, Boynton got to make the historic announcement, “We have water” to his colleagues.

Water on Mars has been a near fact since orbiting cameras began surveying the ground below in high resolution. Geographic structures that resembled dried up river beds and empty lakes were scattered across the Martian landscape. The Phoenix TEGA results now confirm what had been a well-educated guess since 2002.

The samples were taken from a site named Vastitas Borealis which lies at a latitude of 68.21 degrees north. On Earth that would correspond roughly to the latitude of Greenland. Outside of the ice-rich Martian poles, this area was thought to have the highest concentration of water ice on the planet.

According to the Canadian-built weather station aboard Phoenix, the temperatures at Vastitas Borealis are much colder than anything experienced in Labrador. The daytime high might reach  $-30^{\circ}\text{C}$ , while at night it isn't unusual to record  $-80^{\circ}\text{C}$ . Obviously there are no trickling streams with Bambi prancing and butterflies fluttering over them. But frozen or not, it is water, and that means Mars did at one time have lots of water - perhaps as recently as just 100,000 years ago.

If you'd like to catch up on the daily weather report from Mars, visit [www.theweathernet-work.com/marsweather/](http://www.theweathernet-work.com/marsweather/). In addition to a chilling report you'll also find some interest-



**TRENCH ON MARS.** The Mars Phoenix Lander scooped up some pay-dirt in the form of frozen water ice recently making the mission a success and begging the question of could there be or have been life on Mars? Photo courtesy of NASA.

ing background information on the mission, including an interview with Canadian Astronaut, Marc Garneau.

Since the Phoenix Lander touched down on May 25, there have been no technical glitches and all systems are go says NASA's Michael Meyer, Chief Scientist for the Mission. As a result, the mission has received another 30-day extension and won't shut down until September 30th. Unlike the rovers Spirit and Opportunity, Phoenix can't move about and will eventually succumb to the lack of sunlight to recharge its solar cells.

Meanwhile, back on Saturn's moon Titan, things are going swimmingly. Well, if you like taking a plunge into a  $-178^{\circ}\text{C}$  lake filled with liquid ethane that is. NASA scientists have concluded that at least one of the large lakes observed on Saturn's moon Titan contains liquid hydrocarbons, and have positively identified the presence of ethane. This makes Titan the only body in our solar system beyond Earth known to have liquid on its surface.

*John Crossen*

## A Google for Satellites: Sensor Web 2.0

If you could see every satellite passing overhead each day, it would look like a chaotic meteor shower in slow motion.

Hundreds of satellites now swarm over the Earth in a spherical shell of high technology. Many of these satellites gaze at the planet's surface, gathering torrents of scientific data using a dizzying array of advanced sensors — an extraordinary record of our dynamic planet.

To help people tap into this resource, NASA researchers such as Daniel Mandl are developing a “Google for satellites,” a web portal that would make requesting data from Earth-observing satellites almost as easy as typing a search into Google.

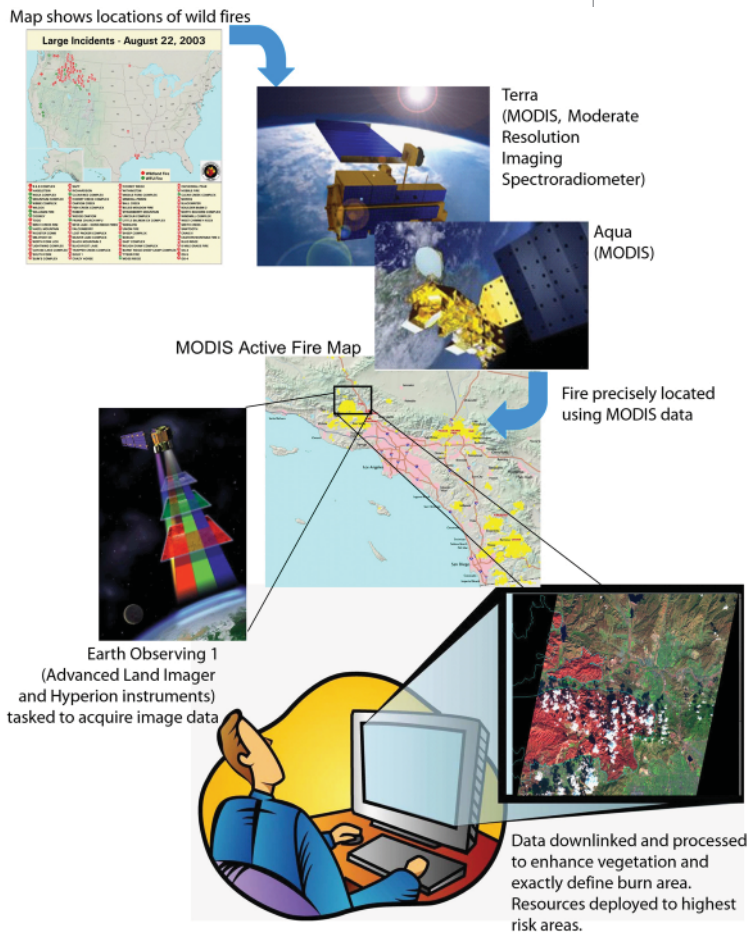
“You just click on it and it takes care of all the details for you across many sensors,” Mandl explains.

Currently, most satellites are each controlled separately from the others, each one dauntingly complex to use. But starting with NASA's Earth Observing-1 (EO-1) satellite, part of the agency's New Millennium Program, Mandl and his team are building a prototype that stitches these satellites together into a seamless, easy-to-use network called “Sensor Web 2.0.”

The vision is to simply enter a location anywhere on Earth into the website's search field along with the desired information types — wildfire maps, vegetation types, floodwater salinity, oil spill extent — and software written by the team goes to work.

“Not only will it find the best sensor, but with proper access rights, you could actually trigger a satellite to take an image in the area of interest,” Mandl says. Within hours, the software will send messages to satellites instructing them to gather the needed data, and then download and crunch that raw data to produce easy-to-read maps.

For example, during the recent crisis in Myanmar (Burma) caused by Cyclone Nargis, an experimental gathering of data was triggered through Sensor Web 2.0 using a variety of NASA satellites including EO-1. “One thing we might wish to map is the salinity of flood waters in order to help rescue workers plan their relief efforts,” Mandl says. If the floodwater in an area was salty, aid workers would need to bring in bottled water, but if flood water was fresh, water purifiers would suffice. An early and correct decision could save lives.



*A “Google for satellites” type of web portal will allow users to request real-time data from Earth observing satellites.*

Thus far, Mandl and his team have expanded Sensor Web 2.0 beyond EO-1 to include three other satellites and an unmanned aircraft. He hopes to double the number of satellites in the network every 18 months, eventually weaving the jumble of satellites circling overhead into a web of sensors with unprecedented power to observe and understand our ever-changing planet.

To learn more about the EO-1 sensor web initiatives, go to <http://eo1.gsfc.nasa.gov/new/extended/sensorWeb/sensorWeb.html>. Kids (and grown-ups) can get an idea of the resolution of EO-1's Hyperion Imager and how it can distinguish among species of trees—from space at [http://spaceplace.nasa.gov/en/kids/eo1\\_1.shtml](http://spaceplace.nasa.gov/en/kids/eo1_1.shtml).

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

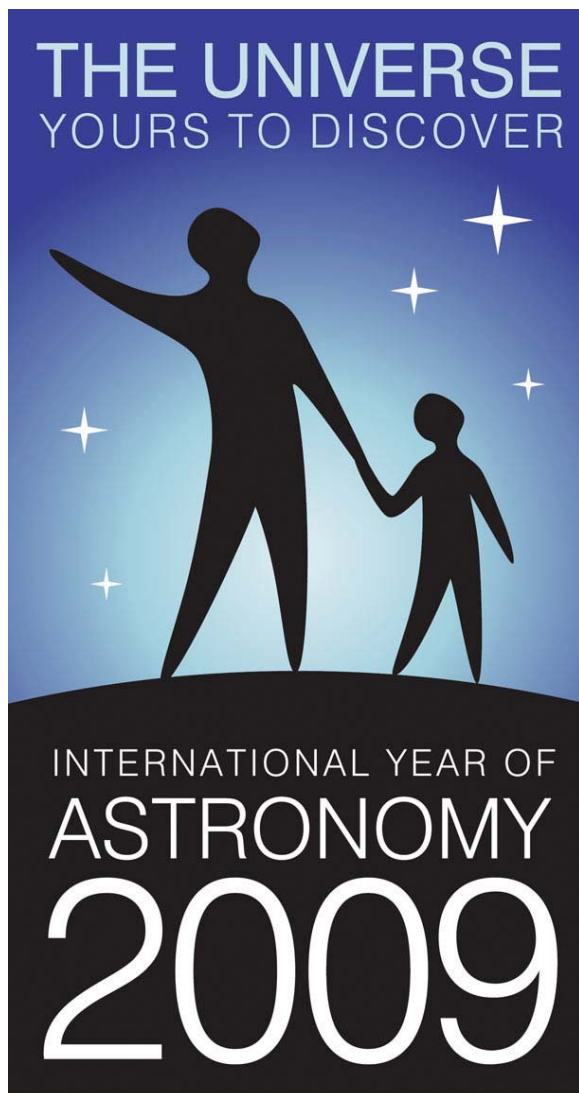
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## International Space Station

have an unobstructed view of the sky from your observation location.

What you see will all depend on how cloud free the sky is and the time of evening that the ISS passes by. Basically, you are looking for a quick moving star-like object to appear at the predicted time and location in the sky and then watch as it traverses a segment of the sky anywhere in one to three minutes. This is a fast moving satellite! If you have ever seen a typical satellite in the night sky you will usually see a dim object moving amongst the stars that does not blink or flash (otherwise you are likely looking at a plane or jet aircraft). The ISS will be unmistakably bright and moving faster than most other objects in the night sky, except meteors.

*Rick Stankiewicz*

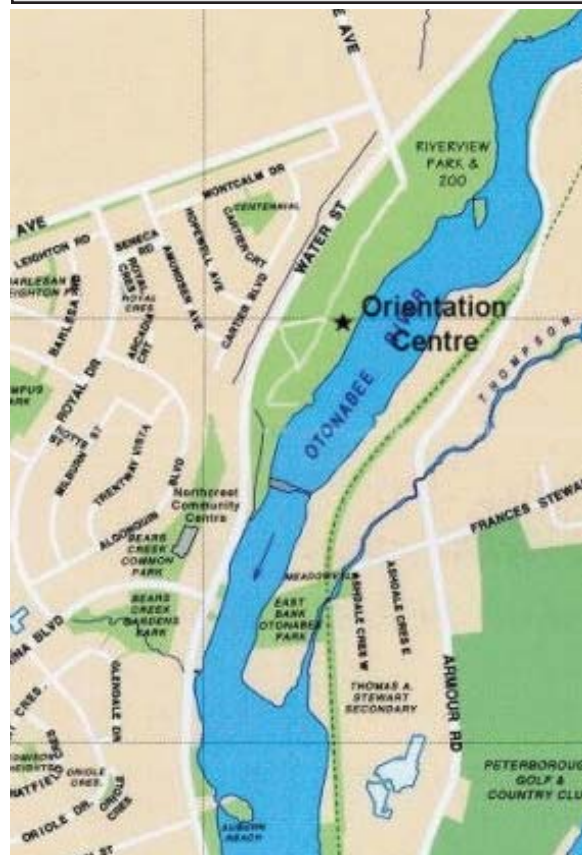


## Articles

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). 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  
445 Park Street North  
Peterborough, ON K9H 4R1  
phillip.chee@gmail.com

**Next submission deadline:  
Sunday, September 28, 2008**



**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 8PM. PAA executive business will be conducted starting at 7:30PM. Members and the public are welcome to attend the earlier time.