

## Editorial

By the time you read this, I will have (hopefully) had some time to look at the night skies from my new place near Orono. For me, this move represents a compromise between what my favorite hobby demands (dark skies) and what the rest of life demands (primarily a location closer to work, etc.), like many Generation X's. Since the drive is now less, I will have some more time to step outside, at will, and look upward without getting too disappointed in what I see. The skies aren't as good as in the Australian Outback, but they aren't as bad as Kawartha Heights either. One can still see the Winter Milky Way - even that close to Toronto. Hopefully, the encroaching light pollution will hold off long enough until I retire or win the lottery (fat chance!). But if not I always have my old observing site near Millbrook!

This month we will be holding our first "Beginner's Night" (of the fall) at Armour Hill. I hope that many of you will find this useful. On the October 4th meeting, I will be giving a beginner's talk on "Finding Your Way Around the Night Sky". Then afterwards we will put some of our knowledge to practical use. Come out and see Pegasus, Andromeda Cassiopeia and other wonderful ("Mira") stuff.

Next month will be the *first anniversary* of "The Reflector" - Oye Karumba! As usual, I am looking for articles. After all, without you there would be no newsletter, but you already knew that, didn't you? Anything related to astronomy will do, such as observing techniques, experiences, upcoming events - celestial or social, reviews on astronomy books, or equipment, interesting projects, astro-photo's you've

taken or whatever your fancy. Don't Be Shy! As small as this may be, here is your opportunity, your 15 minutes (or few pages) of fame!

Clear Skies,

Charles W. Baetsen  
va3ngc@rac.ca

## Sunspots Can Be Picture Perfect!

Ever since I got my solar filter as a Christmas present 3 years ago, I have had lots of opportunities to do solar viewing. It is a real bonus having an astronomical telescope and being able to get some quality daytime viewing out of it. Every day you look at the sun through the scope, it is a different scene. The jet black "umbral" areas (like your eyes pupil) and the gray "penumbral" regions that surround some of them (like the iris), are constantly changing shape. The ebb and flow of electromagnetic energy from deep within the solar furnace create unique shapes that vary in size from barely discernable (a fraction of the size of earth), to huge (many times

the size of earth). To give you a size comparison, if the sun were the size of a VW Beetle, earth would be the size of a dime! My filter that costs about \$125.00, is perfect for safely viewing the black sunspots on the orange disk of the sun. The costly (over \$1,000.00) Hydrogen-Alpha filter will even show you the "solar prominences" around the edge of the solar disk!



The Solar Disk on August 18th, 2002  
with Sunspot Groups #69-#79

I know that not everyone is into watching sunspots, but I am and I was treated to a special view recently as I looked through my small (90 mm) Meade ETX Mak telescope on the sunny afternoon of August 18th, 2002, from my back deck in Keene. On this particular day, there were two rather large areas of sunspots. The largest was about the size of 41 Pacific

## Inside This Issue

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Oceans! This area of activity was designated as Region #69. Below it, was another area designated Region #79. They were both large, but by no means the largest I have ever seen.

What was amazing were the unique shapes they had taken on. Region #69, was the shape of the continent of Australia and #79 was like a "Little Dipper"! I had never seen recognizable shapes before in any spots I had witnessed. Maybe it is a lot like watching the changing shapes of clouds? If you look long enough (and use your imagination), you will see recognizable shapes.

I of course took the opportunity to capture a few images of my "solar pictures" with my digital camera. On this occasion I simply held the lens over the eyepiece and took some shots. In the attached image I think you will see what I mean about the shapes I saw.



If you ever get a chance to safely look at the sun (proper filters or projection methods), have a close look at the shapes of the sunspots and see what pictures you can see.

Rick Stankiewicz  
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## Men Are From Mars - and Glad Of It, Given Its Climate.

Mars is often called the "angry red planet" and it is, indeed, named after the Roman god of war. In keeping with its rebellious nature, Mars also breaks the pattern of size established as

the planets move out from the sun. Mars should be bigger than Earth, but it's diameter is only about half that of Earth. And its mass is just a bit more than 0.38 that of Earth. Hence, a 200 pounder like myself would weigh in at a dainty 76 pounds. Oh to be a man on Mars!

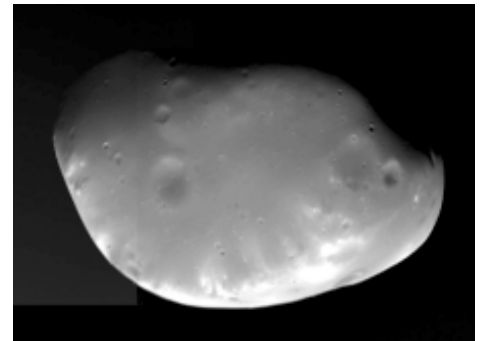


**Angry Red Planet—Mars, shown here with a dust storm raging over the entire equatorial region.**

The red warrior does have a few things in common with Earth. Its rotational period is 24 hours, 37 minutes and 23 seconds -- just a bit longer than that of planet Earth. Mars is also inclined 24 degrees -- a mere half a degree more than Earth. Being more distant from the sun, Mars takes 687 days to orbit the sun once. Hum, that would make me about half my Earth age if I lived on Mars. Another plus for Mars in my books!

Breathing would, unfortunately, be a problem. Mars' weak gravitational pull means that the planet has a very thin atmosphere. And what atmosphere it does retain is mostly carbon dioxide with about 3 percent nitrogen and only a trace of oxygen. So forget about being able to breathe as they do in the Sci-Fi movies. Even the polar ice caps are mostly frozen carbon dioxide -- a.k.a. dry ice. Great for keeping your popsicle frozen, but not so good for melting down and drinking. The Odyssey Mars Orbiter has shown spectrographic evidence of large underground water ice, so bring a shovel.

Mars gets its ruddy complexion from the oxidized iron found on its surface. If you watched last summer's close encounter, you could easily make Mars out as the big red dot low in the southern sky. Because Mars has no body of water, there's nothing to break up a dust storm. So, like last summer, they tend to be global when they happen. As a result all the Martian surface detail vanishes. Even the highest volcanic mountain in our solar system, Olympus Mons, was obscured. And the same was true of Valles Marineris, the 2,500 mile-long fault that surpasses the Grand Canyon in depth -- up to 4 miles deep in spots.



**Deimos ("Panic")—Mars's smallest moon.**

Mars has two small moons, which are probably captured asteroids. They are Deimos and Phobos - named after the



**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**

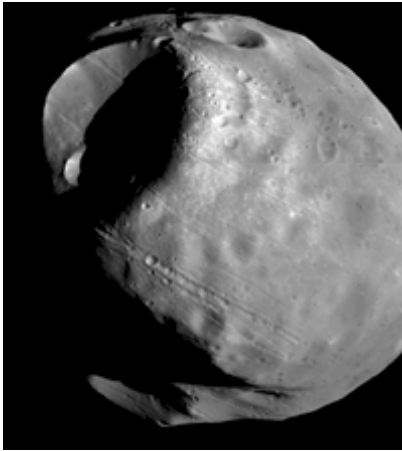
[www.geocities.com/paa\\_ca](http://www.geocities.com/paa_ca)

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**Phobos (“Fear”)—Mars’s (virtual) retrograde moon. Scary isn’t it!**

two horses that pull the chariot of the mythical god, Mars. In English their names mean "Panic" and "Fear". Ever wonder where the word phobia came from (*or for that matter daemon – ed.*)? Because Phobos orbits faster than Mars rotates, it appears to rise in the west and set in the east. Percival Lowell may have thought he saw canals on Mars (*which might of been shadows of his blood vessels in the back of his eye. See S&T Sept 2002 – ed.*), but thanks to photographs from Pathfinder, the Global Surveyor and Viking 1, we know it's a very inhospitable spot to live. And with temperature swings from 37 °C (or 98 °F for you old timers) down to -120 °C (-190 °F), you'd really need a varied wardrobe to contend with things.

So despite the lure of being less than half my Earthly weight and only half my age, I'll take good old planet Earth.

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## Some Summer Constellations

The first two weeks of July in 2002 were exceptionally beautiful and I was fortunate to be on holidays at our family cottage on Chandos Lake. The clear nights inspired me to learn some



**Venus Set**

more constellations with binoculars and the Audubon pocket guide book. Although I missed the southern horizon behind the trees, the rest of the sky was rich with faint stars and the glorious Milky Way. I realized I had to try to preserve some of this treasure and pulled out my ancient 35 mm camera. The Canon Ftb with 50 mm lens is manually operated, so the shutter can

remain open indefinitely on the B setting. Set at f/2.8, and with a tripod, cable release and Fuji 800 film, I started in the late dusk with 30 second exposures. Venus was setting across the lake with shimmering reflections.

Expecting a few pictures to be decent, I was astonished to find the entire roll of film produced acceptable images.



**Cygnus Star Trails**

Luckily, I had a CD-ROM produced during developing, because that was the least expensive combination. The scans of the constellations led me to produce a Flash show to try to convey that night of wonder. I had already composed a music piece called "3=1", based on a pentatonic scale. My instructions to my two collaborators were to use only those tones and play very sparsely and slowly. They didn't hear each other's parts until I combined them simultaneously in real time with lots of reverberation. This semi random approach tried to convey a sense of immense space.

The music and photography resulted in "Some Summer Constellations", 800 KB looping continuously and residing at <http://www.multimediate.com/astronomy> Hope you enjoy the ride. I'll be back for some more winter wonders.

Rob Fisher  
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## The Sky This Month

### MERCURY:

Mercury reaches it's greatest elongation west on October 13th. This is it's best morning view all year.

### VENUS:

Venus is disappearing in the glare of the sun. It reaches inferior conjunction on October 31.

### MARS:

Mars will not be visible this month.

### JUPITER:

Jupiter will be in Cancer and appears as the second brightest object at night. It will be visible in the morning hours before sunrise.

### SATURN:

Saturn will be visible near the Taurus-Gemini boundary, not far away from the Crab Nebula (M1).

### URANUS & NEPTUNE:

Uranus and Neptune will be visible in throughout much of the night in the constellation Capricornus.

### PLUTO:

Pluto is visible in the evening hours in the constellation Ophiuchus near  $\eta$ -Oph. A large telescope ( $\geq 8"$ ) is needed from a dark sky to see this planet. At mag 13.8, this illusive object is on the verge of invisibility, so a good chart (like that in the Observer's Handbook or Sky and Telescope) is needed to confirm it's sighting. Ideally this planet should be viewed over a number of days to detect movement across the starry background.

### METEOR SHOWERS:

Orionids: Peak on October 22 at 4 am.

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

## Off the Beaten Path

This month, we have an opportunity to observe a variety of autumn objects. In addition to the usual deep sky objects, one can see the zodiacal light in the morning, and if you are really at a dark site, try catching the gegenschein, or "counter glow". It can be found directly opposite of the sun's position in the zodiac (i.e., Aries). Both these objects are simply dust floating in the plane of the solar system. Theoretically this dust is visible throughout the year, but if the gegenschein falls in the vicinity of the Milky Way it gets lost among the star clouds.

The zodiacal light doesn't normally suffer this fate, but as it is seen near sunset or sunrise. Its visibility depends on the inclination of the zodiac with the horizon. The more vertical (as in spring evenings, and fall mornings), the

easier it is to see, otherwise it is indistinguishable from the horizon glow.

Here is a list of other often overlooked objects to look for this month.



NGC281 in Cassiopeia

NGC 281 - Located in Cassiopeia, this large triangular shaped nebulous cloud that is easily seen in an 8" scope. A nebula filter will help bring out any detail. I suspect it is also visible in smaller scopes under good conditions.

IC 59 and IC 63 - These are two faint nebulae near  $\gamma$ -Cas. Of the two, IC 63 is the brighter. Since the glare of the central star makes this pair difficult, try placing it outside the field of view.

NGC 7023 - This is another piece of nebulosity located in this area of sky. It should be visible in most scopes under dark skies. It appears similar in appearance to the Cocoon Nebula (IC 5146) in Cygnus. It is well worth the hunt!

NGC 7538 - This is a couple of stars with some nebulosity around them. This object lies on the Cassiopeia/Cepheus border.

NGC 40 - This is usually the lowest (numerically) NGC object that most amateurs can observe. It is located in Cepheus, and is a blue 10th magnitude planetary nebula with an obvious 11.6 magnitude central star.



NGC40 in Cepheus

NGC 7662 - This 9th magnitude planetary in Andromeda is often referred to as the "Blue Snowball", because of its blue-green colour. This colour is caused by strong doubly ionized oxygen atoms. This is an easy object for almost anyone, since it is visible in a 3" or larger scope.



NGC 7662—The Blue Snowball

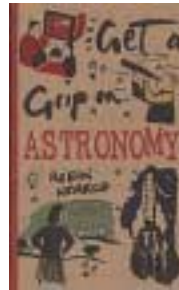
NGC 891 - A 10.5 magnitude edge-on galaxy in Andromeda. Extremely elongated with dust lane. It appears similar to NGC 6535 in Coma Berenices.

NGC 404 - This galaxy is easily found near Beta Andromeda (Mirach). This object used to result in a large number of spurious comet discoveries in the '60s and '70s because it was not plotted on most atlases.

So on the next clear night, be adventuresome and go off the beaten track. Enjoy the new scenery.

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## Book Review



**Get a Grip on Astronomy**, by Robin Kerrod, Times Books, 1999, 192 p., paperback. (~\$5.99 CDN)

I was going to my in-laws for the weekend and we needed to buy them a birthday—father's day—anniversary present (as you can see, fortunately, I don't see my in-laws much). So while my wife looked around *The Bay*, I snuck out to the neighboring *Chapters* outlet to do some shopping myself! (The only thing better than a good belt of scotch to make the in-law weekend more bearable is a good book)

In the bargain bin, for \$5.99 I found "Get a Grip on Astronomy" by Robin Kerrod. This is a great book to get for the beginner astronomer and even the seasoned veteran could learn a thing or two from this book. The writing style is informal and the content is organized into neat, easy to read sections. Although the cover and pages kept me flashing back to grade school when the teacher made you put a brown paper bag on all your new text books to keep them "new looking" (what do kids do now that you can only get plastic bags? But I digress), the paperback size made it easy to bring along on any trip.

The book starts by giving an introduction to astronomy and explaining the basics such as types of telescopes, dark adaptation etc. The book then takes you through a brief history of astronomy. Just the major players were touched on in this section but it was still very informative. The book then moves onto a chapter called "The Night Sky" which covers topics like constellations, the changing seasons, signpost stars. Other topics in the book include The Stars, The Galaxies, The Planets, and Bits and

Pieces which covers everything else in the Universe. Overall, this is a very good book and well worth the bargain price.

With this book, I got a grip on astronomy....now if I could only get a grip on my wife's credit card bill from *The Bay*.

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## What Is The Most Southerly Declination Visible From Our Northerly Latitude?

*This article first appeared in the North Shore Erie Amateur Astronomer's newsletter "The Stargazer". Reprinted with the Author's permission.*

As shown in Figure 1, the simple answer to this question is that the sum of your latitude in degrees and the most southerly declination in degrees always adds up to 90 degrees. Consequently if your latitude is 42 degrees North then the most southerly declination visible is 48 degrees South and occurs on your local meridian.

Similarly on earth's equator your latitude is zero degrees so you can observe to declination 90 degrees South, which is the South celestial pole. At the earth's North pole your latitude is 90 degrees North so the most southerly declination visible is zero degrees or the celestial equator.

In practice the answer is not so simple. To obtain a realistic value for the most southerly visible declination we need to include the effects of a non spherical earth (whose shape we assume does not depend on longitude but only on latitude and can be approximated by an ellipsoidal surface), elevation above your local terrain, and atmospheric refraction on the observer's horizon.

We first discuss a non spherical shape of the earth. The earth's radius at the poles

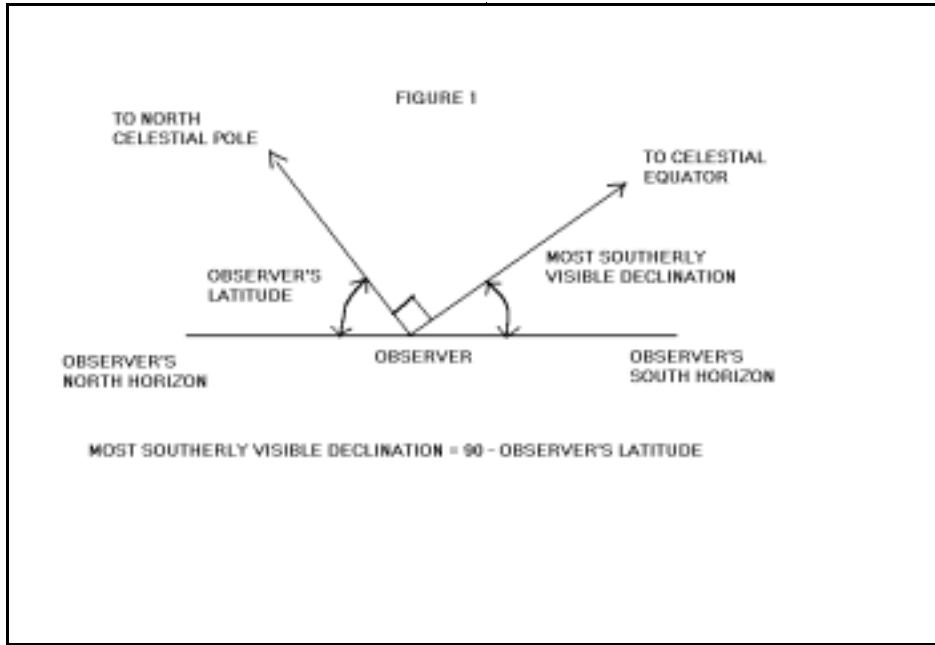


Figure 1: Most Southerly Visible Declination (Simple Calculation)

Your North Latitude (degrees)	Loss of visibility in South Declination (min of arc)
0	0
10	3.9
20	7.3
30	9.8
40	11.2
50	11.2
60	9.8
70	7.3
80	3.9
90	0

is 6357 km whereas the radius at the equator is 6378 km. We can describe this shape as an oblate spheroid or more simply as a slightly squashed sphere. In figure 2, we show that the observer on the oblate earth in general does not see as far South as an observer on a spherical earth. They see the same amount only at either the poles or at the equator. The reason for this is that the plane of the horizon at the North pole on a spherical earth is parallel to the horizon plane on the oblate earth. In the table on the next page we calculate this loss of visibility of South declination in minutes of arc for several different latitudes. As you see in the table the greatest loss of visibility occurs between latitude 40 and 50 degrees in the amount of a little over 11 minutes of arc (or about 1/3 of the diameter of the moon). It appears in the table that the loss is the same for latitudes whose sum is 90 but in fact they would be slightly different if we had more decimal places. In figure 2 below the loss of visibility of Southerly declination is the angle between the two sloping straight lines, although greatly exaggerated in size.

The next factor to be considered is atmospheric refraction on the horizon. In a previous article we showed that

refraction by the atmosphere provides a gain of visibility by about 35 minutes of arc on average. This can change slightly due to higher or lower atmospheric pressure.

The last factor we consider is height of the observer above the local terrain. At the surface of a lake your horizon is very close to you but as you move higher above the lake your horizon

recedes from you and you gain further visibility of the south declination. An approximate expression for this gain is as follows. If we let the height of the observer above the local terrain be  $h$  in kilometers then the gain in visibility of south declination in minutes of arc is approximately 61 times the square root of  $h$ . In the table on the next page we show this gain for several heights  $h$ . For

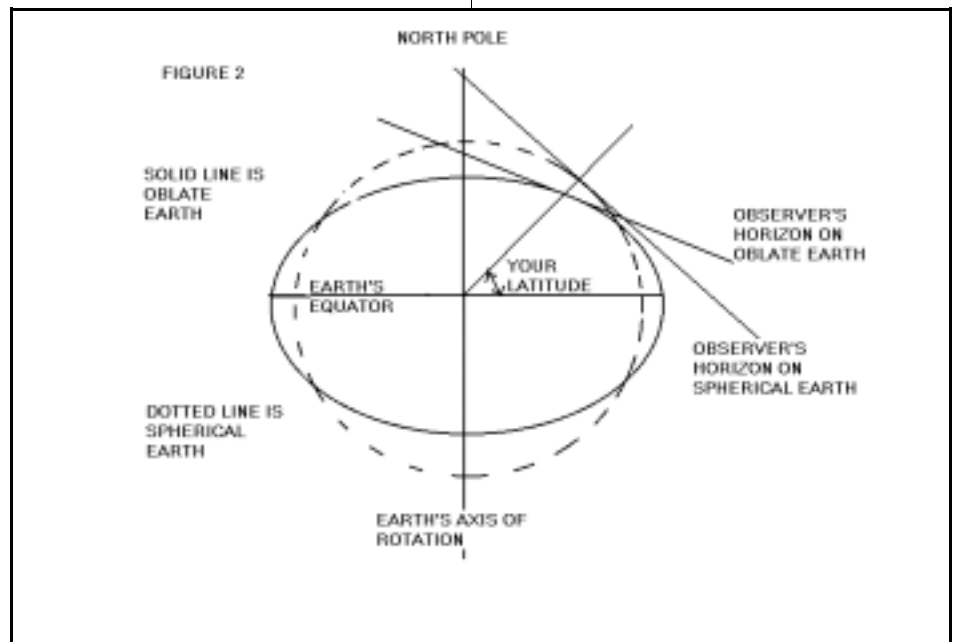


Figure 2: Most Southerly Visible Declination – with an oblate Earth

example at a height  $h=0.2$  km from the table we get a gain of 27 minutes of arc or almost the diameter of the moon. A plane flying at height  $h = 2$  km would have a gain of 86 minutes of arc or nearly 2 and a half times the diameter of the moon.

Height (h) above local terrain (km)	Gain of visibility in South Declination (min of arc)
0	0
0.1	19
0.2	27
0.5	43
1.0	61
2.0	86
5.0	136
10.0	193

A few members of our club (NSEAA) have expressed an interest in attempting to observe the globular cluster Omega Centauri. Its Right Ascension is 13 hours and 27 minutes and its Declination is 47 degrees and 29 minutes South. This cluster is four times bigger than M13 in Hercules and 2 magnitudes brighter. The latitude of Port Dover is about 42 degrees 44 minutes. Is it possible to see Omega Centauri from Port Dover? We will give an estimate as follows. Assuming a spherical earth, the most southerly declination visible is  $90 - 42$  degrees, 44 minutes = 47 degrees, 16 minutes so Omega Centauri would not be visible. However if we add a loss of 11 minutes for oblateness and a gain of 35 minutes for refraction and a gain of 19 minutes for a height  $h=0.1$  km we get a most southerly declination visible of 47 degrees and 59 minutes which would put Omega Centauri about 30 minutes, or one moon diameter, above our south horizon and should thus be visible. You must also have a perfectly clear view of the south horizon and the cluster transits

late in the evening during May. Atmospheric extinction will reduce the brightness by about 6 magnitudes so the cluster will appear about magnitude 10. Good luck and good hunting!

Anton Jopko  
amj@kwic.com

## Stargazers Feed The Bookworms

For the past nine months Buckhorn Observatory has been collecting donations for the Buckhorn and Cavendish Libraries. Rather than charge a fee to visitors, the observatory asks them to make a donation. On September 18<sup>th</sup> the observatory was delighted to present the Library Board with a cheque for \$800. According to head librarian Maria Bradburn, a portion of the funds will be spent to update the astronomy and science sections of both libraries.



**Presentation of cheque**

Since first opening to the public about two years ago, Buckhorn Observatory has been host to over 800 guests and has done a number of offsite presentations and sky tours with community groups. Future plans call for more of the same - with a couple of months off this winter to do a little astrophotography.

John Crossen  
JohnCstargazer@aol.com

## Classifieds

### For Sale:

**Slip on bracket** for 50 mm finder with shoe - \$15

**Celestron Piggy-back Mount** - \$15

**Manfrotto 410** camera/slow-motion mount - \$200



**Bausch & Lomb 4000 Series Telescope:** Fork-mounted with R.A. motor drive - \$325 Includes: Star diagonal, 6x30 dovetail finder, visual focal reducer, 120V cord, all original owner's manuals, camera adapter piggy back mount, table-top screw-in legs (adjustable for polar alignment), hard shell carry case.

Contact: John Crossen  
Phone: 705-657-7718  
E-mail: johncstargazer@aol.com

### For Sale:

**Meade 1.25" 90° star-diagonal** for Schmidt-Cassegrain Telescopes . Asking \$55.

**Oak Tripod** Asking \$10.

Contact: Charles Baetsen  
Phone: 705-876-0986  
E-mail: va3ngc@rac.ca

## ARTICLES

**S**ubmissions for *The Reflector* must be received by the date listed below. E-mail or “sneaker-net” (i.e., floppy disk) submissions are preferred (Microsoft Word, ASCII and most graphics formats are acceptable). Typed or hand-written submissions are acceptable provided they are legible (and not too long). Copyrighted materials will not be published without written permission from the copyright holder. Submissions may be edited for grammar, brevity, or clarity. Submissions will be published at the editor’s sole discretion. Depending on the volume of submissions, some articles may be published at a later date. Please submit any articles, thoughts, or ideas to this address:

Charles Baetsen  
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L0B 1M0

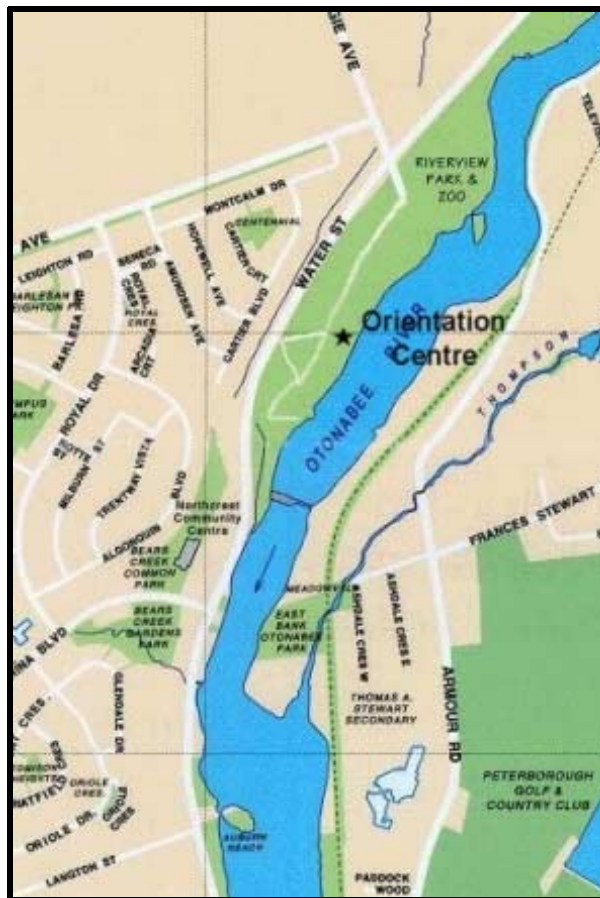
or via e-mail at:  
va3ngc@rac.ca

**NEXT ISSUE'S  
DEADLINE IS  
Oct. 28th, 2002**



## MEETINGS

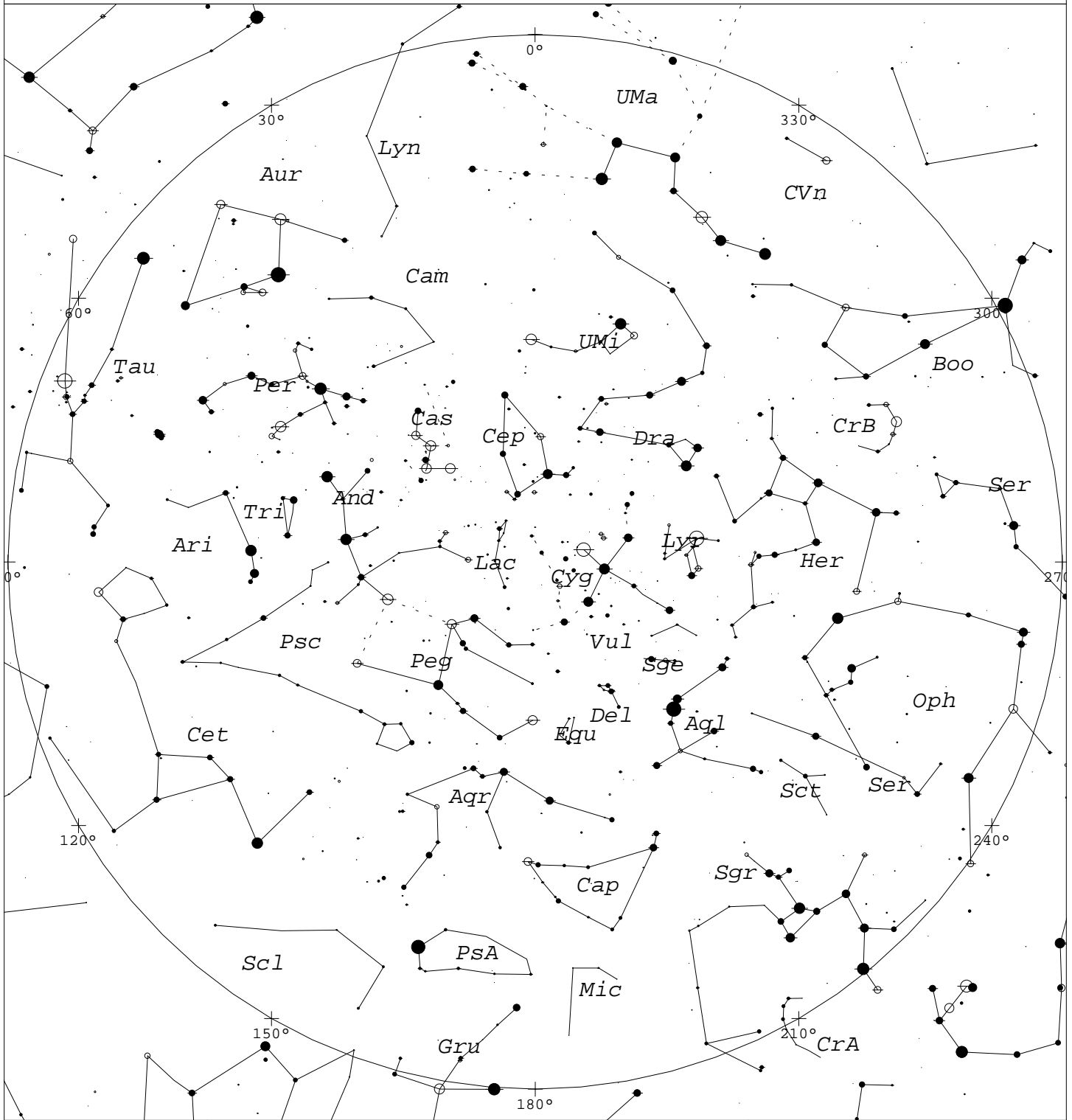
The Peterborough Astronomical Association meets every second Friday at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **7:30 pm**.



## 1 CALENDAR OF EVENTS 1

October 4, 2002, 7:30 pm	<b>General Meeting</b> — Topic: “How to Find your Way Around the night sky”. Observing Session on Armour Hill afterwards
October 6, 2002	<b>New Moon</b> (●)
October 13, 2002	<b>First Quarter</b> (☾)
October 18, 2002, 7:30 pm	<b>General Meeting</b> — Leo Enright, author of the <i>Beginners Observing Guide</i>
October 21, 2002	<b>Full Moon</b> (☉)
October 29, 2002	<b>Last Quarter</b> (☾)
November 1, 2002	<b>General Meeting</b> — Topic TBA, with observing session afterward at Armour Hill

# October Skies



STARS		SYMBOLS		
● <1	• 3.5	● Multiple star	☐ Dark nebula	△ Radio source
● 1.5	• 4	○ Variable star	⊕ Globular cluster	× X-ray source
● 2	• 4.5	☄ Comet	⊙ Open cluster	○ Other object
● 2.5	• >5	☉ Galaxy	⊖ Planetary nebula	
● 3		☐ Bright nebula	⊞ Quasar	

Local Time: 21:00:00 1-Oct-2002  
 Location: 43° 39' 0" N 75° 0' 0" W

UTC: 02:00:00 2-Oct-2002  
 RA: 21h42m29s Dec: +43° 38' Field: 182.0°

Sidereal Time: 21:42:29  
 Julian Day: 2452549.5833