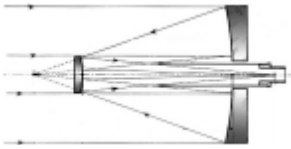
PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR



Volume 2, Issue 11 November 2003

Editorial

This past few weeks there was lots to keep club members busy. On October 30th, the skies cleared and after sunset, there was something bizarre in the eastern sky. I recall looking in that direction to see a rose coloured cloud! Even the reddest sunset cannot produce a colour like that. It could only be one thing, a real bright auroral display! And what a display! The sky was not even dark yet, the moon was bright an only first or second magnitude stars were visible, yet this rose coloured glow was present in the sky. As it got darker, it got even brighter. Unfortunately it after about 8:00 most of it's activity was over.

On November 8th we were treated to another day with clear skies. Which was fortunate as there was a total lunar eclipse that night. This was the first one we were able to see in this area in some years (mostly due to poor weather).

The biggest event of the past two weeks, wasn't in the night sky, but back here on earth. On October 31st, the members of the PAA ratified a new constitution and set of bylaws.

Among other things, the new bylaws establish membership classes and membership fees. There are currently four classes of membership: Individual, Family, Student and Honourary.

Any individual, who is interested in astronomy, can become a member by paying the "Individual Membership" fee of $30.00.

A "Family Membership" is also available for those who also want their spouse and/ or children to be members of the PAA. The annual fee for this is $40.00.

October 30th, we were treated to one of the brightest Auroras in a long time. The red color above was clearly visible in early twilight.

Fulltime students either in elementary, high school or a post secondary institution can apply for a "Student Membership". The current student fee is $10.00/year.

From time to time the PAA may bestow a "Honourary Membership" to a person for outstanding contributions to astronomy. Honourary members will get an individual membership for that year free of charge.

The constitution and bylaws also establish a governing council. This is an important change from the way we have done business in the recent past. This is where **you** can make a difference.

Every individual's opinion is important and necessary to have a club that represents its members. By becoming involved on council you will have an opportunity to help direct the club's future. No position is particularly

Inside This Issue

onerous, but every position is important. Working together for something we all believe in is profoundly satisfying and creates strong bonds with fellow members. The club benefits from your efforts and you will belong to an organization that is "us" rather than "them". It is up to you to get involved!

Elections will be held at this year's "Annual Meeting" which is **on December 12th**. Council positions for the next term (which runs from Jan 1st, 2004 - December 31, 2005) will be filled by elected or by acclamation. All qualified members are invited and encouraged to join the PAA's council. Since this is the first council, all current members on our membership list will be grandfathered as being eligible to stand for council provided that they pay the membership fee for the upcoming year by the January 9th, 2003 meeting.

The council consists of the following positions :

- President
- Vice President
- Secretary
- Treasurer
- Observing Director
- Editor
- Membership Director
- Publicity Director
- and 4 councillors at large

If you are interested in joining the council, please contact Dave Duffus (dduffus@cogeco.ca) or Charles Baetsen (va3ngc@rac.ca) on or before the **November 28th** meeting!

Your club needs you!!!

Copies of the new Constitution and Bylaws can be obtained from our web page *http://www.geocities.com/paa_ca*.

Clear Skies

Charles W. Baetsen
va3ngc@rac.ca

PAA members filled the McDonald's Observatory. It was cloudy outside, but that didn't stop the conversation inside – in between mouths full of coffee cake, that is.

When It Comes To Observing, We Get Around

PAA members met recently at Jaan Teng's for one of our sessions and at Don McDonald's observatory for another. These sessions are great little mixers and take us out of the meeting format into a less formal environment. While I missed the session at Jaan and Susan's, I was delighted to join "our gang" at Don and Carolyn's. As the fates would have it, we scored another cloudy night. But that didn't put a damper on the conversation.

Verbal highlight of the evening was Al Day announcing that the night marked 19 years of living (and loving) together with Dianne. I think that was the first time we've ever seen Dianne blush. Nevertheless, congratulations again to both.

On a more astronomical note, John Crossen brought along an 8-foot steel pipe that club member Jim Webster will be using as a pier in his upcoming observatory. If there's enough left over, Jim promised to give it Charles Baetsen who is also looking for a second permanent pier.

Of course, while at Don's we enjoyed a

Peterborough Astronomical Association

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

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tour of his observatory and it would be unfair not to mention the coffee and treats served up by both Don and Carolyn. Our thanks go out to Jaan, Susan, Don and Carolyn for sharing their hospitality with us.

John Crossen

The Sky This Month

MERCURY:

Mercury will be visible in the evening sky in the last half of this month.

VENUS:

Venus is finally visible in the evening sky after sunset..

MARS:

Located in Aquarius, Mars is still quite amazing to behold, even after opposition.

JUPITER:

Jupiter will be in Leo and is visible in the early morning.

SATURN:

Saturn is visible this month just before midnight, located in Gemini.

URANUS & NEPTUNE:

Uranus and Neptune are visible in Capricorn. Finder charts are available in *Sky & Telescope* or the *RASC Observer's Handbook.*

PLUTO:

Pluto is no longer visible.

METEOR SHOWERS:

Leonids: Peak on Nov. 13 (Europe)
Peak on Nov. 19 (Canada/US)

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

The Lunar Eclipses of 2003

We have been blessed with two lunar eclipses in 2003, but if you lived in southern Ontario the first one (May 15th) was a washout as the clouds made sure of that. I think would have had to fly to Thunder Bay to see skies clear enough to witness it.

The redeemer was the second show on November 8th. The conditions were near perfect. Cold, clear skies and no wind made for a memorable evening for a lunar eclipse. I do hope you were able to witness it first hand. The attached photo shows a full moon around mid-totality (8:16 p.m.EST). This is a digital image that was tracking on a telescope for a 10 second exposure and the colours are richer than you will remember them in real time as the camera can saturate better than our "minds eye".

One thing was evident throughout the main part of this eclipse. The lower edge of the moon never got as dark as the rest of the surface. This was because the lunar disk never plunged deep into the heart of the Earth's shadow, as happened during the January 20, 2000 eclipse. None the less, it was a great event to be part of last night and one that I will be looking forward to at the next opportunity (October 27, 2004).

A 10 second exposure of the full moon around mid-totality (8:16 p. m.EST

Up to this point I had not had the chance to try capturing a total lunar eclipse because in 2000 it was minus 24 degrees and a wind-chill that wiped out my cameras and me before totality arrived. This recent eclipse sure made up for it though.

Until next time,

Rick Stankiewicz
PAA member
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Contrast, What Does It Mean?

It is well known that refractors are better telescopes for planetary viewing because they produce a higher contrast image. I recall a film by Kodak that was called High Contrast Pan because of its higher contrast. We also avoid looking at the full moon because it has very low contrast. So what is contrast?

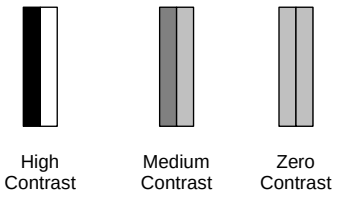

Figure 1: Contrast

Looking at Figure 1 we see three pairs of vertical strips. The left pair contains a pure black strip beside a pure white strip. This produces the highest contrast between them. For the other pairs, the dark strip is getting less dark and the white strip less bright. In general terms,

contrast is the property of the difference in brightness between two side-by-side areas.

Mathematically, contrast is defined as the ratio of the difference in brightness of the pair of strips to the sum of the brightness of the pair. Suppose we assign a brightness of zero for the black strip and one for the pure white strip then the contrast ratio is (1-0)/(1+0) = 1. So for the pair (A) of strips, contrast is equal to one. For the pair (C), contrast is zero because the brightness of both strips are equal so their difference is zero. For the central pair (B), contrast is about 0.5.

Any optical system, such as a telescope, cannot reproduce the same contrast in the image as in the object because of diffraction and aberrations. In this case light from the brighter strip will leak into the region of the darker strip lowering the contrast. For films, we similarly can have leakage from the brighter strips into the darker strips. The finer the grain the less leakage however.

Newtonian and Cassegrain telescopes have the secondary mirror in the aperture of the telescope, so more light is spread out in the diffraction pattern compared to refractors. This decreases the contrast. On the other hand, a poor quality refractor will produce less contrast than a diffraction limited Newtonian.

The width of the strips also affects the ability of a telescope to maintain contrast in the image. Clearly the wider the strips the easier it is maintain contrast in its image since light would have to travel much further to leak out of the brighter strip and enter the darker strip. The term spatial frequency describes the difference in width of the vertical strips. Wide strips represent a low spatial frequency whereas narrow strips represent higher spatial frequencies. One can think of spatial frequency as the number of strips per centimeter of film or per centimeter in the field of view of an eyepiece. It can also be described as the density of strips

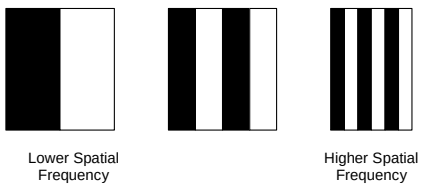

Figure 2: Spatial Frequency

In Figure 2, the contrast is the same in all parts (A), (B), and (C). The total width of each of the three groups of strips is also the same but Figure (C) has the highest spatial frequency or density of strips. It is much more difficult for a telescope to preserve the contrast in (C) than in (A) since the strips will appear mostly gray.

In conclusion, the best contrast is always a desirable property but achieving it in an image when viewing the planets or the moon is never completely assured even with perfect optics.

Anton Jopko
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PAA Members Ratify Our New Constitution And Bylaws

Club member Sandy Johnston's basement wall filled to the walls with fifteen club members. This was one of the most important meetings of the year, as we read and discussed the various points which our steering committee had put together for the PAA's new constitution. It is a credit to the steering committee (Dave Duffus, Charles Baetsen, Rob Fisher, and Rick Stankiewicz) that there were so few suggestions for improvement or changes required. We also thank everyone who took the time to voice their opinions on the content. Just for the record, those present included: John Crossen, Rene Bowe, Len Bailey, Jaan Teng, Don McDonald, Rick Stankiewicz, Robert Fisher, Sandy Johnston, Mike Ricks, Ray Wingette, Paul Brown, Susan Phair, Bill Plews, Dave Duffus and Charles Baetsen. Guys and Gals, you were all witnesses to a historic event. Be proud.

John Crossen
JohnCstargazer@aol.com

Yikes, We've Been Stamped

In addition to ratifying our new constitution at the last PAA gathering, we were also given a set of the Canada's latest edition of stamps. The stamps honour the eight Canadian Astronauts who have been part of the crew on recent space missions. They also break with tradition by being the first "live" people other than the Royal Family to be shown on a Canadian stamp. Our thanks to Rick Stankiewicz for giving everyone at the meeting a complimentary set. They are absolutely beautiful. If you'd like more – Christmas is coming – there are still some available through the post office.

John Crossen
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Astronomy in Philately: A Quiet Solar Year

It may be hard to imagine, but our sun actually goes through periods of relative calm. The eleven-year solar cycle is marked with years of notable inactivity. This is evident by a lack of sunspots. We are currently to be starting into one of these "quiet times". You would never know it by the amount of recent activity. Just a few weeks ago we had the biggest best round of auroras that

This 4 Kopek Soviet stamp depicts a radar dish used to monitor solar activity

we had seen in almost two years! A couple huge sunspots that have since disappeared around to the other side of the solar disk triggered all this. Having said this, at the time of this writing (Nov.9th) the sun is a blank slate. I can't recall the last time there has been such a lack of sunspot activity.

This month's stamps relate directly to the above issue of solar activity (or lack thereof). They were issued on January 1, 1964, to mark the International Quiet Sun Year. The 4 Kopek stamp depicts a radar dish. This was the preferred way to monitor solar activity in that day. Of course we have the SOHO (Solar & Heliospheric Observatory) spacecraft to do this task today.

The 6 Kopek Soviet stamp shows the moon orbiting earth, set against our sun.

The 6 Kopek stamp shows the moon orbiting earth, set against our sun. This reminds one of the dynamics that take place for us to observe solar and lunar eclipses on earth. In fact, this stamp shows the makings of a lunar eclipse like happened last evening.

As quiet as the sun can be at times, you never know when it will decide to flare up and send some charged particles our way. Keep looking up, but remember to always do it safely and only use safe solar viewing methods.

Your Astronomical Philatelist
Rick Stankiewicz
stankiewiczr@nexicom.net

Boring November? Not this year!

Ok, so November isn't the most thrilling month. And yes, for this part of Canada it is usually the cloudiest 30-day stretch of the year we have to endure. But this November it just ain't so. We've had beautiful aurora, giant sunspots, a total eclipse of the moon, Mars is still a good target, and on the 19th we might just get a clear shot at the Leonid Meteor Shower. Throw in a history-making Mass Coronal Ejection (MCE) and this has been a terrific month for stargazers.

Buckhorn Observatory was active on the night of the Aurora with a group of late-season cottage stalwarts joining Deb and myself for an evening of eclipse gazing. One of our visitors, Gord Simpson, took some digital pictures of the event, which I'm happy to share with you. The rest of us were content just watching through binoculars.

I'm always amazed at how the stars begin to switch on as the moon goes deeper into the eclipse. By totality it was like a perfect fall night and I swung the giant binoculars around to M38, M36, and M37. Kurt Simpson, Gord's young son, sighted the Pleiades in his binoculars, and when watching the eclipse we could hear him exclaim a long, drawn out "cooooooool" more than a few times.

This was the 4th lunar eclipse for Deb and

Saturday, November 8th brought clear skies and a total eclipse of the moon. Digital photo by Gord Simpson

November 4th's Aurora were bright enough to be photographed from suburban Schomberg. My thanks to Gord Rife for the photograph.

I, and I must admit it was the peachiest one (literally) we have ever seen. The fact that the Moon didn't dive deep into Earth's shadow was the reason for the light colour and the relatively short – 25-minute duration at totality. At any rate, it was beautiful.

The aurora was a bit less stunning for us as it overlapped our sunset, which was immediately followed by clouds. So there I stood, camera loaded and mounted on the tripod with nothing to shoot. Fortunately Club President Dave Duffus and Mister Astrophotography, Gord Rife, were more fortunate.

For me, the giant sunspots were a real treat, and I managed a good session with scope and camera. The one spot was large enough to hold planet Earth about a dozen times over, and the second spot wasn't exactly dainty, either.

History-making sunspots resulted in a spectacular aurora display that could be seen as far south as Arizona. Photo by John Crossen.

So, here's to a good Leonid Meteor Shower. We're already booking guests at the observatory and keeping our collective fingers crossed for clear skies.

John Crossen
JohnCstargazer@aol.com

What was that Eclipse good for Anyway?

Events like last month's lunar eclipse may look pretty, but they also gave us insight into our place in the universe.

In about 130 BC, the Greek astronomer, Hipparhcus, used an eclipse similar to the one seen on November 8th to determine the size of the moon. How did he do this?

Long before his time, it was realized that both the earth and the moon were spheres. He noted two important observations that we may even overlook. These are that:

1. The angular size of the sun and moon area the same (~0.5°)
2. The shadow of the earth on the moon during an eclipse is approximately 2.67 times as large as the moon.

From #1 we can deduce that:

$$\frac{R_s}{r_e} = \frac{R_m}{r_m}$$

From # 2,

$$\frac{R_{sun}}{r_e + r_m + a} = \frac{R_e}{r_m + a} = \frac{2.67 R_m}{a}$$

Rearranging we get:

$$R_s - R_e = \frac{r_e}{r_m}(R_e - 2.67 R_m)$$

Let's define $n = \frac{r_e}{r_m}$

Since $R_s = nR_m$

we get: $R_m = 0.273 R_e (1 + \frac{1}{n})$

If we assume that $n >> 1$ (i.e., the sun is much further from us than the moon), then we get:

$$R_m \cong 0.273 R_e$$

This leaves us with the problem of finding the earth's radius. Eratosthenes of Cyrene (~200 BC) was the first person to determine the size of the earth. He knew that on the summer solstice the sun shone directly into a well at Syene, Eqypt at noon. At the same time, in Alexandria, approximately 800 km north, the angle of inclination of the sun's rays was about 7°. With these measurements you can compute the diameter and circumference of the earth.

Using, $s = R_e \theta$

where θ is the angle in radians, s is the arc length (i.e., distance between the two places):

We get $$R_e = \frac{180}{\pi}(\frac{800}{7}) = 6540km$$

The actual value is 6263 km, not bad for 2200 years ago!

This would mean that the moon's radius is 0.273(6540) or 1785 km. The actual value is 1737 km!

Since we know that the moon's apparent diameter is 0.5 degrees, we can now calculate the distance that we are from the moon by:

$$\frac{R_m}{r_m} = \tan(0.5°) = \frac{1}{115}$$

This gives a value for r_m=205000 km.

We could go on and calculate the sun's radius and the distance from the earth to the sun, but since we do not have a precise enough number for the actual size of the earth's shadow on the moon, our calculations would be suspect as we would end up dividing by a small number that is the difference of two close numbers, which introduces numerical error.

Charles W. Baetsen
va3ngc@rac.ca

Definitions:

R_s= radius of the sun
R_e= radius of the earth
R_m= radius of the moon
r_e= Earth-Sun distance
r_m= Earth-Moon distance
a= distance from sun to point where earth's shadow comes to a point.

The Enigma

There used to be clear skies in Lochlin, and then I bought a telescope. Now there are clear skies during the day-just enough to raise our hopes-then heavy cloud cover at nightfall. At least that is how it seems to be, or am I remembering the beautiful clear nights we have had over the past 35 years, and forgetting the cloudy ones, now that I want every night to be clear? I remember as a child, my parents telling me that we only remember the things we want to remember and see the things we want to see.

During the past summer we did have numerous occasions when the sky was clear enough to give us some beautiful views of the Red Planet. On one occasion, Joe, a retired friend of mine asked if he could come over one evening to see Mars, he would bring his son, Chris, who is in his mid 30's. Of course I agreed, and on the appointed evening I aimed my 8" Sky Watcher at Mars and focused in. I saw the South Polar Cap and a dark and circling the equatorial region, then I told them what to expect and gave them turns at the telescope. Joe saw nothing but the reddish surface; while Chris saw the Polar Cap and the dark region I had referred to and even mentioned the variations in it. This situation reminded me of what my parents had told me. Did I see the polar cap and dark band because my fellow hobbyists had told me they were there? Joe didn't see them but commented on the red surface – we all know Mars has a red surface. Perhaps my telescope isn't large enough to show the polar cap and dark band clearly. Chris saw them but was it because I said they were there?

Do we really just see what we want to see?

John (Ian) Craig

Classifieds

TelRad with mount and battery. $25.00 takes it.

Jason binoculars. 7X50 with long eye relief for eyeglass wearers. Feature centre hole for tripod mounting and homemade dew shields.
Excellent star images. Great for beginners. $75.00

Contact John Crossen: 705-657-7718. Email: johncstargazer@aol.com

Meade LX90 in excellent condition. Computerized, motor driven with 8" aperture. Includes carry bags and more.

Contact George Bryant: 705-292-8953. Email: georgebryant@sympatico.ca

Tektites:

Have your very own Tektite at a very reasonable price! Tektites are glassy pieces of rock that are formed when meteorites or asteroids impact earth. Earthen material is fused together and ejected into space to fall back as, "Tektites". This may be the closest to a space object that you can own? These specimens come from China. For sale, are four nice sized and shaped specimens of the unusual varieties that Tektites are found in. Each one is unique. They are available for $6.00 each. Each specimen comes with a sheet that tells the story of Tektites.

Contact Rick Stankiewicz
Phone (705) 295-6158
E-mail: stankiewiczr@nexicom.net,

Only while supplies last!

WE NEED YOU!

To join our first council

Nominations are due **November 28**

Elections will be held on
December 12th

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:

Charles Baetsen
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Orono, ON
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or via e-mail at:
va3ngc@rac.ca

NEXT ISSUE'S DEADLINE IS

Dec 8th, 2003

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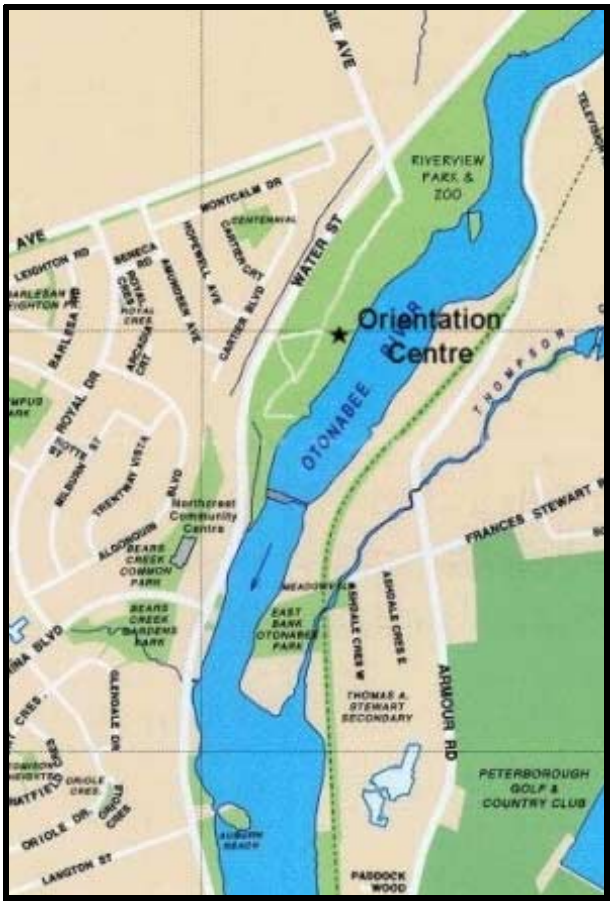
MEETINGS

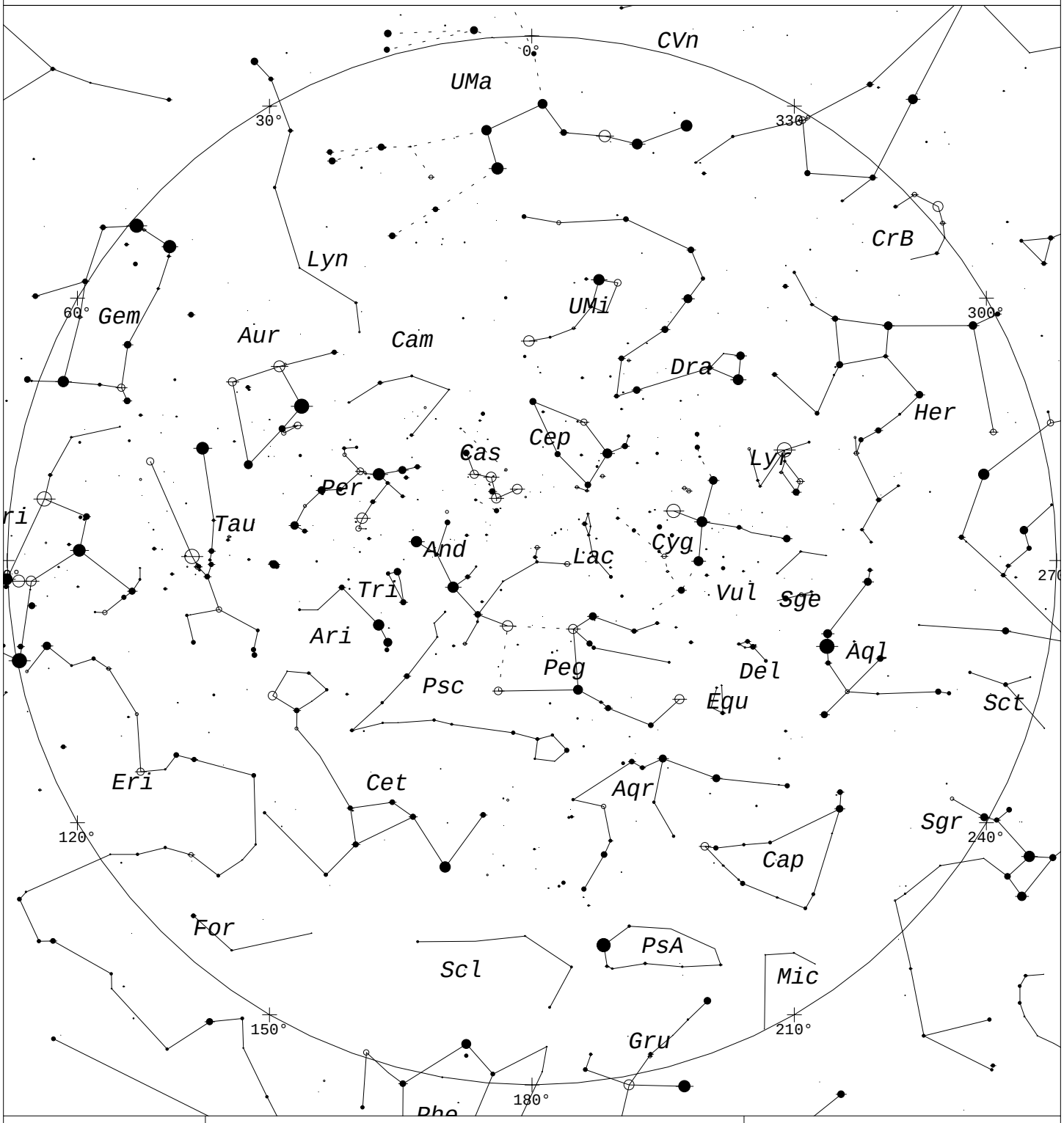
The Peterborough Astronomical Association meets every second Friday at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **7:30 pm**.



CALENDAR OF EVENTS

November 8, 2003	**Full Moon (○)**
November 14, 2003	**General Meeting** — Len Benschop—Webcam Astrophotography
November 16, 2003	**Last Quarter (☾)**
November 23, 2003	**New Moon (●)**
November 28, 2003	**General Meeting** — TBA. Nominations for Council are due
November 30, 2003	**First Quarter (☽)**
December 12, 2003	**Annual Meeting** — Elections to Council.
December 8, 2003	**Full Moon (○)**

November Skies



STARS

<1	3.5
1.5	4
2	4.5
2.5	>5
3	

SYMBOLS

Multiple star	Dark nebula	Radio source
Variable star	Globular cluster	X-ray source
Comet	Open cluster	Other object
Galaxy	Planetary nebula	
Bright nebula	Quasar	

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

UTC: 02:00:00 2-Nov-2002
RA: 23h44m42s Dec: +43° 38' Field: 182.0°

Sidereal Time: 23:44:42
Julian Day: 2452580.5833