PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR

Volume 1, Issue 7 May 2002

Editorial

The fair month of May is now upon us. Personally, this is one of my favourite times to observe the night sky. There are no bugs, the nights are mild and there are lots of interesting deep-sky objects to view from the spring galaxies to the summer nebulae and globular clusters. Also, for our area, May generally has the most (astronomically) clear nights of any month.

Last month, was a busy month for our members. On April 16th, I helped my wife show off the night sky to some of her Grade 6 students and parents. We had a wonderful view of the moon and the five brightest planets from the school grounds in Cobourg. Most were amazed with what you could see in a "real" telescope.

Some students from Cobourg look through binoculars at the night sky.

On Astronomy Day (April 20th), several members of the club showed off the night sky to the public that night on top of Armour Hill. We had an estimated that anywhere between 100 and 200 people showed up to look at the planetary alignment. All six major planets were visible—Mercury, Venus, Mars, Jupiter, Saturn and off course Earth! In addition the moon also wooed many onlookers who were impressed with the cratering. I understand from John Crossen, that he was also busy that night with 30 people showing up at the Buckhorn Observatory. This is definitely something we should try again in the summer. Thanks to all who participated.

Next month we are planning a trip to the David Dunlop Observatory in Richmond Hill. The date for this event is June 15th at 10:00 pm. The cost is $5.00 per person. We will most likely be car pooling. If you would like to come, please let Dave Duffus know so he can mark you down.

Clear Skies,
Charles W. Baetsen
va3ngc@rac.ca

Astronomy Day 2002—Jaan Teng shows off Saturn to members of the public that came out to Armour Hill on April 20th.

Inside This Issue

Planetary Alignment Keeps Buckhorn Observatory Busy

I had barely recovered from last weekend's Astronomy day gathering, which brought over 30 guests to the observatory, when yet another stampede arrived. Indeed, on Wednesday, April 24 five carloads of enthusiastic Grade 9 science students poured into the observatory.

Lead by Paul Webster, their science teacher, the students viewed all five naked eye planets from Jupiter down to diminutive Mercury near the horizon. With the aid of the giant binoculars, the students quickly picked out Mercury in the glow of the sunset. About ten minutes later it was visible to the eye. At 11x, the binoculars also revealed Jupiter's 4 closest moons – but just.

PAA member Charles Baetsen (thank you) lent a helping hand by manning the binoculars and a spare telescope as the students broke down into smaller groups for a close-up look at the two gas giants – Jupiter & Saturn as well as the Moon. None of the kids had seen them "live" through a telescope, so the experience was quite exciting.

I must also tip my hat to another club member, Guenther Hilpert. He also assisted with an informative commentary on the planets as the students waited their turns at the telescopes.

I guess the gathering was a success, as the next day, I received a call from another teacher asking if her two science classes could visit next week. Yikes, I've created a monster!

It's great to see the kids and give them some idea of how observational astronomy works. Being from the city, most of them have no night sky to appreciate. So even with the Moon nearly full, they were impressed. It was also fun reminding them that they'd probably all be parents in their '50s by the next similar planetary alignment in 2036.

John Crossen
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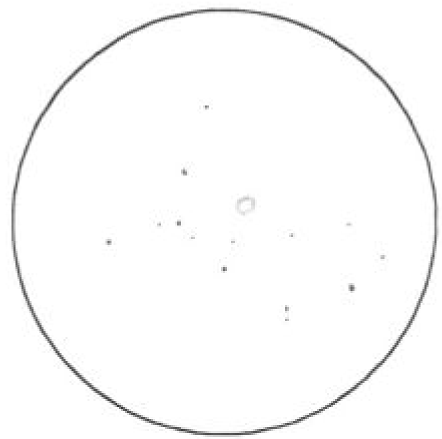
The Buckhorn Observatory (view towards the North)

Off the Beaten Path

Spring is traditionally known as "Galaxy Season", however there are many other types of objects visible as well. Spring and early summer are also good times to see various planetary nebulae. Probably the most famous planetary nebula is the Ring Nebula (M57). I know, this article is supposed to be about those not so famous objects, but this is a good object to warm up on and it demonstrates my point - there is more than just galaxies in spring.



M57–Sketched by the author on 17-May-93

In Hydra there is an interesting planetary nebula called "The Ghost of Jupiter". It is

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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located 1.8 degrees south of μ-Hydrae. This planetary, known as NGC3242, consists of two shells, an inner elliptical one (that looks like an eye) and a fainter outer spherical one. The Ghost of Jupiter has a high surface brightness (with an integrated magnitude of 9.0) which means it can stand magnification well, so enjoy it! According to my observing notes from previous years, it really does look like Jupiter.

NGC3242 or The Ghost of Jupiter, located in Hydra

Another good spring planetary is NGC6543 or "Cat's Eye", located in Draco. This is a very obvious planetary in an 8"-scope, but can be seen quite nicely in smaller scopes as well. It is located about half way between δ and ζ Draconis. Again the surface brightness is high (with an integrated magnitude of 8.5) - so use high magnification to see its shape. In photographs it appears like two ovals superimposed on each other with one rotated almost 90° from the other.

NGC6543—The Cat's Eye Nebula located in Draco

A real good challenge object is the interacting galaxies called "The Ringtail" (NGC4038/4039) in Corvus. In the past, I have tried to see this in a 12" scope outside of Waterdown (with the city to the south) but I was unsure whether I saw or imagined it. It appears as a backwards question mark in photographs, but to me it was just a blob at the edge of perception. This is definitely a dark sky object. According to *Burnham's Celestial Handbook*, it has an integrated magnitude of 11.0, so it is not impossible.

NGC4038/4039—The Ringtail, located in Corvus

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

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An Open Invitation To Visit Buckhorn Observatory

If you haven't had the chance to visit Buckhorn Observatory, here's what's up for the summer of 2002. Club members are always welcome and are encouraged to bring their telescopes along. If you're planning on staying overnight, there's plenty of room to pitch your tent, and we'll leave the doors open so you may use the washrooms. Coffee and toast are on the house next morning. Just let us know when you're coming via the phone 657-7718 or e-mail us at: johncstargazer@aol.com. You are also welcome to bring friends along – it's all in the name of promoting astronomy. Below is our summer public observing schedule. We're also open to the public on Wednesday nights unless there's a full moon or it's cloudy. There is no charge, but donations to the Cavendish/Buckhorn libraries are welcomed.

Buckhorn Observatory Summer Schedule

May 17–18	Back To The Moon
June 7, 8 & 9	Binocular night
July 12, 13 & 14	Great Balls Of Fire
Aug 11, 12,& 13	Climb The Milky Way

Interpolation In A Table

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

We often find information in a table which is of interest to us but the values listed are not appropriate for our choice of date or location. The process of estimating the required information specific to your needs is called interpolation. There are various types of interpolation with increasing accuracy available but the method we will describe here is called linear interpolation and is straightforward and provides acceptable accuracy. The producer of the table should choose the intervals between dates and latitudes so that the table remains small but also that linear interpolation will give good results. For example, in the table below

Time of Sunrise	Latitude 40°	Latitude 45°
May 2	4:59 am	4:48 am
May 6	4:55 am	4:43 am

we list the time of sunrise in LMT as given in The Observer's Handbook for two dates and two latitudes.

Suppose we wish to estimate the time of sunrise on **May 5 at latitude 42 degrees**. As a general rule we should choose one of the four sunrise times that is **closest** to our desired date and latitude as our **reference point**. In this case we should choose **May 6 at latitude 40 degrees** as our reference point and our reference time of sunrise is **4:55 am**. We will only need the information in column two and the bottom row of the table to do our interpolation. **We do not use time of Sunrise for May 2 and latitude 45 degrees at all since this is furthest from our chosen reference point**. May 5 is ¼ of the interval from May 6 to May 2 so the time of sunrise at latitude 40 degrees is ¼ of the change in time of sunrise between May 6 and May 2. This value is ¼(4:59-4:55)=1 minute. So the estimated time of sunrise at latitude 40 on May 5 is 4:56 am. Similarly we now interpolate in latitude. Latitude 42 degrees is 2/5 of the interval between latitude 40 and latitude 45 degrees. Consequently there is an additional change in time of Sunrise equal to (2/5)(4:43-4:55)=-4.8 minutes. **Therefore our final estimate of sunrise on May 5 at latitude 42 degrees is 4:55 am + 1 minute – 4.8 minutes = 4:51.2 or 4:51 am.**

To test your understanding of interpolation please try to estimate the time of sunrise on May 3 at latitude 43.5 degrees. The answer will appear elsewhere on this page.

Anton Jopko
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TRIVIA

1) One astronomical unit is the average distance between the Earth and Sun. One light year is the distance light travels in one year. There are 63,200 astronomical units in one light year. That is, light travels a distance equal to the distance between the Earth and Sun 63,200 times in one year.
2) If the orbit of the Earth around the Sun were the size of a dime, then the distance to the nearest star would be 2.4 km.
3) The star Deneb in Cygnus is one of the most energetic stars known. It emits about 50,000 times as much energy as our Sun.
4) If the Earth were the size of a dime then the Sun would be the size of a sub compact car.

Answer: our reference time of sunrise is **4:48 am** on **May 2 and latitude 45** degrees. The estimated time of sunrise for our location is therefore **4:48 + ¼ (4:43 – 4:48) minutes + (1.5/5)* (4:59 – 4:48) minutes = 4:50 am**. We do not use the time 4:55 am at all.

The Sky This Month

MERCURY:

Mercury will be visible in the evening for the first half of this month. Look for a lone white "star" in the NW, 30 to 40 minutes after sunset. This is one of the best times to view this normally illusive planet.

VENUS:

Venus is climbing higher in the west It is the brightest object in the night sky this month.

MARS:

Mars is visible in the south in Taurus area after dusk. Look for a 2nd magnitude red "star".

JUPITER:

Jupiter will be in Gemini and appears as the second brightest object at night.

SATURN:

Saturn is in the constellation Taurus in the western evening sky. This will be the last month that you can catch this planet until the fall.

URANUS & NEPTUNE:

Uranus and Neptune are in Capricornus and are visible in the early morning sky.

PLUTO:

Pluto is visible in the morning hours in the constellation Ophiuchus near η-Oph. A large telescope (≥ 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:

There is one major shower this month:

Eta Aquarids April 21-May 12

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

Measuring the Speed of Light - Part 2

Isn't it wonderful when a problem doesn't work out and there appears to be no easy solution. I feel that you learn the most when you run into difficulties. And that's just what happened to me when I set out to duplicate Roemer's experiment to measure the speed of light.

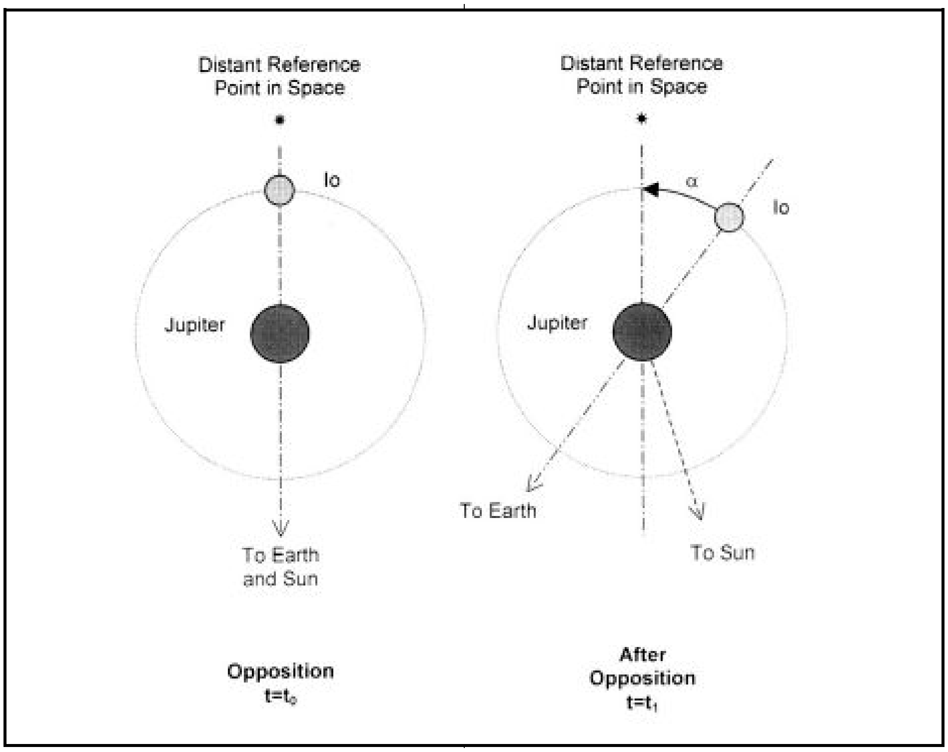
Io and Jupiter

In, Measuring the Speed of Light - Part 1 (which appeared in the January 2002 issue of The Reflector), I described the ingenious method in which Olaf Roemer (1644-1710) measured this velocity using Jupiter's moons. I set out to do the same thing but soon realized that it was not as easy as I previously thought. I observed the occultation of Io and noted the time. I then punched the time into my computer and it dutifully spit out garbage (GIGO principle). My data did not agree with the predicted time in the RASC handbook, even when I added the delay for the travel of light to the times. I spent several evenings trying to figure out my mistake by checking my program over and over. I even made another program using a spreadsheet instead, but the dates and times agreed with my previous program. I even had Charles Baetsen (our fearless editor) write his own program to confirm my results, which it did. Now instead of one nuclear engineer being perplexed, there was two (How many nuclear engineers does it take to change a light bulb? Seven. One to install the new bulb and six to figure out what to do with the old one for the next 10,000 years).

Perspective, Perspective, Perspective—I needed to get some perspective on this problem, and the perfect place to get together and figure out my conundrum was of course…..a donut shop! Besides, the Timbits® and donuts would come in handy for visual aids (after several coffees even the hole of a donut can look like the Great Red Spot). After several trips to the coffee shop and after gaining several pounds, I did not gain any insight into this problem. It was time to bring in an expert.

Charles suggested that I contact a former professor of his from McMaster, Dr. Anton Jopko (many thanks Anton). Maybe he could give me the perspective that the Io shaped Timbit® could not. So I emailed Anton and explained my problem to him, and he replied, explaining the effect that was causing the discrepancies in my calculations. He told me that I needed to get some perspective in my life. That was it, it was all about perspective!

When I observed Io disappear, Jupiter was very close to opposition (a straight line from the Sun, through Earth to Jupiter) but as time passed and Earth's position in its orbit shifted, the angle of this line became greater, and the perspective in which you observed the event changed. It is not unlike a person who watches the moon rise. An observer who is situated more East would have observed the moon rise earlier while an observer who is situated more West would not yet have seen the moon rise. The same thing is happening when you observe Io disappear from one time to the next. The Earth has moved and now the angle that the Earth makes with Jupiter is different (refer to figure above). As it turns out this effect can offset the time by as much as 78 minutes. This is a much greater effect than the added 18 minutes that it takes light to travel from Jupiter to the Earth. The result is that the occultation time for $t=t_1$ would happen earlier than your program would predict.



The Geometry of the Earth-Jupiter-Io system. After opposition, Io appears (to Earth observers) to be in the same spot in it's orbit (with respect to Jupiter) earlier than predicted. The time it takes Io to traverse the angle α must be subtracted off any calculations as it will mask the effect due to the speed of light.

Time to check the calculations: An occultation occurred on January 1st, 2002 at 12:54:00 Universal Time (UT). Plugging this number into my computer program I get a predicted time of April 1st, 2002 at 19:11 UT. Subtracting -78 minutes for the perspective effect and adding 8 minutes for the light delay, we get a predicted time of 18:01 UT. The RASC Handbook gives a time of 18:04 UT or about 3 minutes different. I can live with this difference and with everything that's going on in the world today, it's comforting to know that some things can be predicted.

Will Juodvalkis
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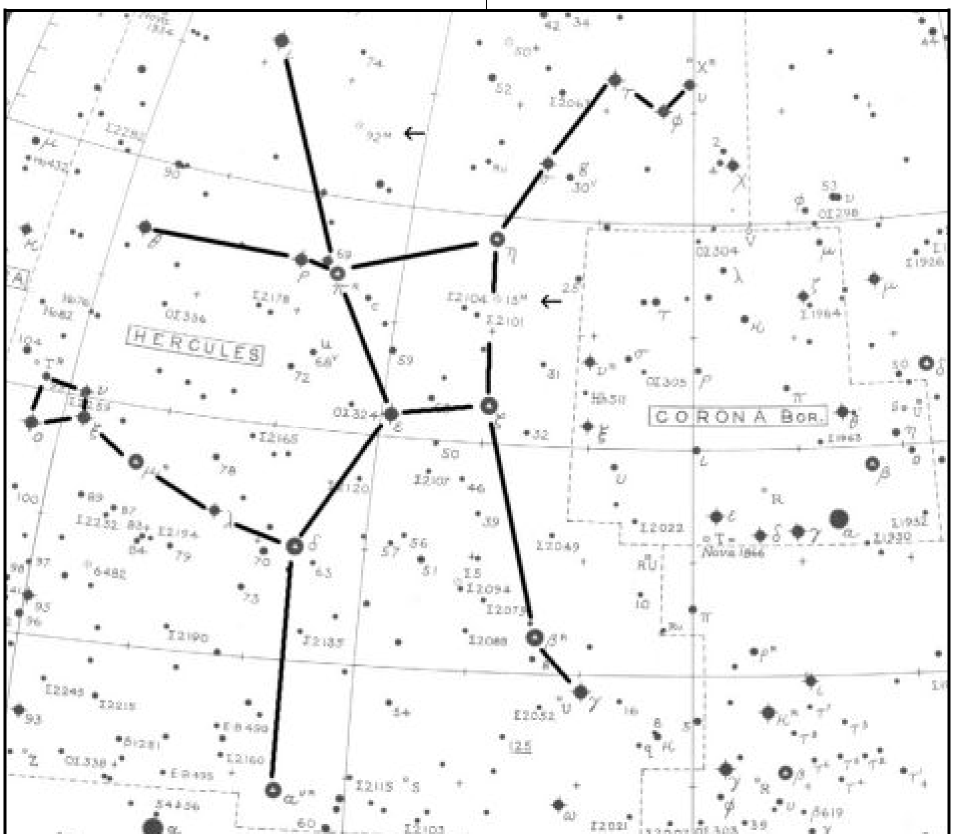
Archaic Star Name of the Month

Last Month's Answer:
Mizar (ζ-UMi)

Gone Stargazin': See Two Globular Star Clusters in Hercules.

As planet Earth hurtles deeper into the spring quadrant of its orbit around the sun, the constellation Hercules comes into view. Traveling with the famous strongman are two celestial treasures for careful observers. Both are globular star clusters - mammoth balls of stars - half a million or more in a clump. But to find them, you must first find Hercules.



Hercules and Corona Borealis. The arrows indicate the location of the two globular clusters M13 and M92

About an hour after dark (10:00 p.m.) Hercules is 18 degrees above the north/ northeast horizon. A large keystone shape (see star chart) is the most readily identifiable segment of the constellation. Pointing towards it is a circlet of stars called Corona Borealis or The Northern Crown. Within Hercules' boarders are two stunning globular star clusters. Both can be seen in 7x50 binoculars.

The largest is called M13 or "The Hercules Cluster". It is visible as the fuzzy peak of a tiny star triangle in binoculars. Through an 8-inch telescope at about 140 power it becomes a spectacular ball of stars. In fact, M13 is regarded by many as the finest globular star cluster in the Northern Hemisphere. To spot it, look about 2/3 of the way up along a line drawn between the two stars that mark the topside of the keystone.

The second globular cluster is M92. Imagine it as the peak of a triangle formed in conjunction with the two stars that comprise the longest portion of the keystone shape.

Those of you who are impressed by distance will delight to the fact that M13 is 21 000 light years from Earth and M92 is just a bit further at 26 000 light years. Given that a light year (the distance a beam of light would travel in one year) is 10 trillion kilometers, that's a fair hike.

Put Hercules on your "Hit List" this spring. May is one of the nicest months of year to be outdoors. It's not too hot, not too cold, and best of all…the mosquitoes aren't out yet

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Comet: Ikeya-Zhang - Going, Going, but Not Gone!

It has been a good couple months for comet watchers. Since early March, Comet Ikeya-Zhang (pronounced “eh-KAY-uh-jung”) has been visible in our northern skies in the evening. This comet was ranked as the fifth brightest comet in the last 25 years. Since April, this comet has been a better early morning sight and is fading fast. By late March it had reached it’s peak brightness of magnitude 3.4. This meant that it was easily visible in a dark location with your naked eye. The impressive tail of this comet was best seen with binoculars or a telescope and you did not need much

Ikeya-Zhang on March 16, 2002

power. I have attached an image I captured of the comet from my backyard at the north end of Peterborough on March 16th. Using 800 ASA print film and just a 135 mm lens and a 2-minute time exposure (tracking with my telescope), the tail was very distinct. Even in the light polluted skies of the city, the tail of the comet looked this good in 10 power binoculars. It was low in the western horizon too!

Ikeya-Zhang on April 18, 2002

A month later, I took a similar shot from an even darker location north of Peterborough and the attached image from April 18th shows a much less distinct tail, but still a nice coma (head of the comet). It is evident from comparing these photos that Ikeya-Zhang is on its way out of our solar system for another 341 years. It should still be visible with binoculars or a small telescope during the month of May. You will have a difficult time seeing the tail now, but the coma should be easy to see as a nice fuzzy ball in a background of stars. It helps to know where to look though. A finder chart can be found on a website like www.spaceweather.com or the current issue of *Sky News*. On International Astronomy Day (April 20th) some of the public was treated to a nice view of the comet in binoculars from Armour Hill, later in the evening. The tail was not visible at this time, but the coma was very distinct.

If you have not caught a glimpse of this comet yet, don't miss out. It's not too late, but your chances are slipping away every day you wait (or we have cloudy skies). Enjoy it while you can because it could be a while until we get a better chance to see a comet like this one.

Rick Stankiewicz
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The Wonderful World of Nebula Filters

This article is intended to take the mystery out of nebula filters. At the end of this article I hope to leave you with an idea of what nebula filters do, what objects are good candidates for filters, and why filters should be included in every serious observer's equipment bag.

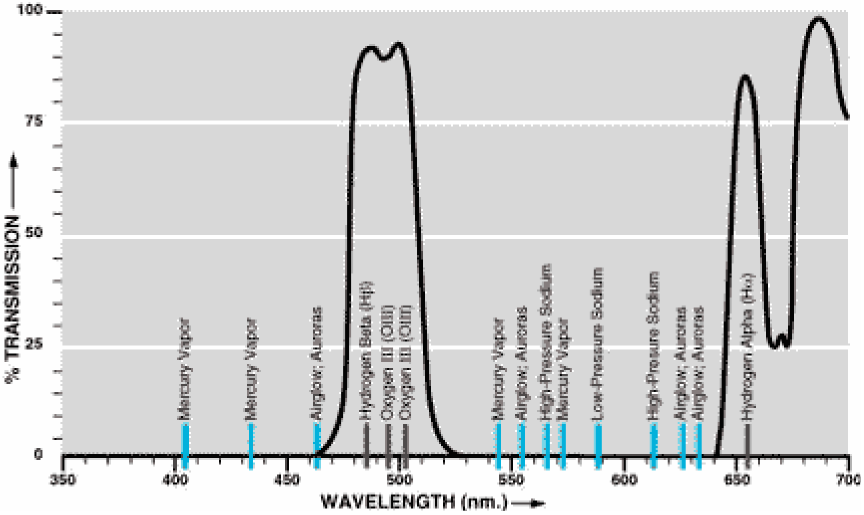
Nebula filters first appeared in the mid 1970's. Like most things they sounded too good to be true, and were viewed as gimmicks by most amateurs at the time. Fortunately they were wrong, as nebula filters do help bring out the invisible.

How do they do this? They can't intensify light from distant objects can they? No, but what they do is increase the contrast between an object and the background sky. As most astronomers know, even on the darkest night, far away from the city lights, the sky is never perfectly dark. One reason is that dust and humidity in the atmosphere scatters sunlight (and city lights etc.) reducing sky contrast. Another reason for this "sky glow" is auroral activity. Even on nights of no auroral activity there is still some sky glow due to solar activity.

To help combat these effects, nebula filters were invented. These take advantage of the fact that emission nebula emit light only at discrete wavelengths (or colors) of the spectrum. Filters are designed to pass these particular wavelengths of light only. As one might expect, in practice this is not the case, but a range of colors is passed (known as the bandwidth). The narrower the bandwidth, the less unwanted light is passed, and hence the greater contrast.

Light emission in most nebulae is primarily due to excited hydrogen and oxygen atoms. Hydrogen emits light in two areas of the spectrum called H-α (656 nm) and H-β (486 nm). You may recall that H-α is the type of light you want to see if you are looking for granules and prominences on the sun. Doubly ionized oxygen is called O-III (O-I is un-ionized oxygen) and emits light at both 501 and 496 nm wavelengths. This type of emission is quite common, hence the development of the O-III filter. Some emission nebula have strong emissions of nitrogen (N-II) light at 658 nm. In comets, cyanogen, a gas peculiar to comets, emits light between 494-518 nm. Low pressure sodium vapour lights also emit light at discrete wavelengths which means a filter could be designed to block only that light (i.e., light pollution filters). Stars, and hence clusters and galaxies emit a broadband spectrum of light and are not good candidates for filters, as almost all of their light would be blocked.

The two most common filters are the narrowband (i.e., Lumicon *UHC* and Orion *Ultrablock*) and *O-III* (Lumicon) filters. The narrowband filter has a bandwidth of 24 nm and lets light pass through from 482-532 nm. This will let the two O-III and H-β emission lines through. These filters are also designed to let the H-α light through as well. This filter darkens the sky increasing the contrast between the sky and the object. It is a good general purpose filter for viewing emission nebulae from suburban and rural locations. The *O-III* filter is of similar design, but has a narrower bandwidth of only 11 nm, boosting the contrast even more. This is particularly good filter for viewing most planetary nebulae and supernova remnants like the Veil.



Typical transmission curve for a O-III filter. Note that it lets the O-III, H-α and H-β wavelengths through and keeps streetlight emissions out!

Another type of nebula filter is the broadband (i.e., Lumicon *Deep Sky*, Orion *Skyglow*). As their name suggests, they pass a much wider band of light through. Their purpose is to reduce the light due to light pollution (particularly from sodium and mercury vapor lights). These are useful for photography since they reduce sky fog, extending useful exposure times.

As you might have guessed, the only objects nebula filters can be used on are **emission nebulae**. This includes both diffuse and planetary nebulae. All planetary nebulae glow due to fluorescence, making all of them good candidates (assuming they emit the right light). On the other hand, not all diffuse nebulae are good candidates for filters. Reflection nebulae (which appear blue in photographs) reflect the broadband light received from nearby stars and hence suffer the same problem as stars, clusters and galaxies, that is, almost all of their light would be blocked by the filter.

One thing to keep in mind is **filters dim everything!** Even for emission nebulae, only 85% to 90% of their light is passed. However, the goal here is to dim the unwanted light more than the nebula light. .

Personally I think a good set of nebula filters (particularly a narrowband and OIII set) should be included in everyone's bag of equipment. Even under dark rural skies, filters can help bring out detail because of the natural sky glow. The typical cost of a nebula filter is around $175 CDN, making it a cheaper alternative to that 24" scope. If you can have both, then you're really cooking!

Charles W. Baetsen
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Astronomy in Philately

This month it seems only appropriate that for an astronomical subject on stamps I would choose "comets". With the appearance in our skies of Comet Ikeya-Zhang in March and its departure this month as it leaves our solar system for another 341 years, this periodic comet reminds us of another more famous comet that was depicted on stamps a few decades ago. In 1986 the most famous periodic comet, Halley's, returned on its 76 year round trip through the solar system. This last trip was similar to our current visitor, in that it did not life up to its infamous brightness levels and it was ranked at only the fourth brightest comet in the last 25 years, just ahead of Ikeya-Zhang.

On Halley's last return there was much fanfare and anticipation around the world. Included here is a pair of stamps from a set of six that were produced by the Hungarian Postal Service (Magyar Posta), in 1986 to honour the return of our icy celestial visitor. These are both 2 forint denomination stamps that depict an image of Halley's Comet in the upper background, overlaid with a research satellite from a different country and then a scene depicting Halley's from a previous visit in history. In the lower portion of the stamps is a map of the comets orbit showing it's location in February of 1986, when it reached it's closest approach to earth.

A Hungarian Stamp depicting Comet Halley and the Vega Satellite

The first stamp shows the Russian satellite Vega with a portion of the Bayeaux tapestry showing the return of Halley's Comet in 1066 AD. This tapestry was done in France and is known for its depiction of the Battle of Hastings. Obviously, Halley's made quite an impression back then. The Russian Vega space probes were aimed at both Venus and Halley's Comet. Vega 2 came within 3000 km of the comet and helped in pinpointing the nucleus for future space probes like the Giotto spacecraft. The second stamp shows the Japanese satellite Suisei with a German engraving from 1507, of Halley's Comet. I can only assume that this depiction is from the return in 1456, as the next return was not until 1531. The Suisei probe was similar to the Russian probes in that it was sent to study Halley's Comet from space in aid of understanding the composition of this frozen visitor.

This Hungarian Stamp shows the Halley's Comet and the Susei Probe

I doubt that Ikeya-Zhang will make it on a postage stamp in our lifetime, but maybe they will be ready in the year 2343 to do something about this.

Your Astronomical Philatelist
Rick Stankiewicz
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Classifieds

For Sale:

Slip on bracket for 50 mm finder with shoe - $15:00

Celestron Piggy-back Mount - $15

Manfroto 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.

Typical B&L 4000 (not actual scope)

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

For Sale:

8"-f/7.5 Dobsonian
8-inch f/7.5 Newtonian on specially designed Dobsonian mount that is extremely light and portable. Comes with Quick Finder and homemade finder scope (approx 9x50). Excellent Optics. Overall tube length is 62". Asking $600.00 or B.O.

8" Dobsonian

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

Time Travel

The merry month of May has played host to a number of important astronomy-related events. Here are a few of them:

May 1, 1949 – Gerard Kuiper discovers Nereid a moon of Neptune
May 4, 1967 – Lunar Orbiter IV launched
May 5, 1961 – Alan Shepard become first American in space aboard Freedom 7
May 6, 1975 – NASA announces Canada will build the shuttle's robotic arm
May 7, 2002 – Moon at apogee (farthest from Earth)
May 11, 1974 – SMS-1 (first geostationary weather satellite) launched
May 20, 2002 – New moon
May 14, 1973 – Skylab launched
May 15, 1997 – STS-84 Atlantis launched
May 18, 1969 – Apollo 10 launched
May 19, 1996 – STS-77 Endeavour launched
May 20, 1978 – Pioneer-Venus 1 launched
May 22, 1969 – Apollo 10 lunar module descends to 50,000 feet of Moon's surface
May 23, 2002 – Moon at perigee (closest to Earth)
May 24, 1961 – Scott Carpenter is the first American to eat food in space
May 25, 1961 – JFK Challenges American to make a Moon landing
May 26, 2002 – New Moon
May 27, 1999 – STS-96 Discovery launched
May 28, 1959 – Rhesus monkeys Able & Baker first primates in space
May 29, 1919 – Einstein's General Theory tested during an eclipse
May 31, 1975 – European Space Agency formed

What did the comet say to the other comet?

Glad to meteor!

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
244 Ridgewood Rd.
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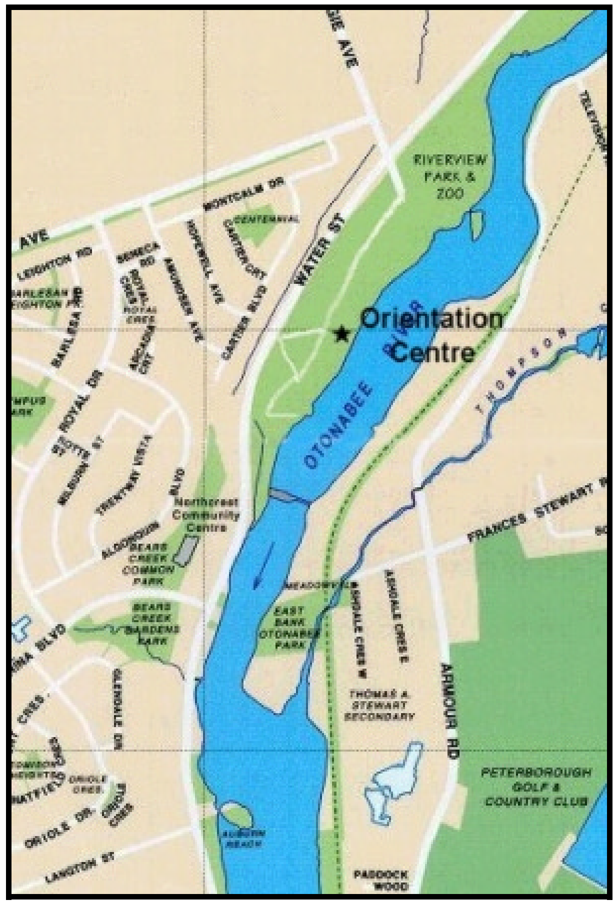
NEXT MONTH'S DEADLINE IS

May 27th, 2002

⌘

MEETINGS

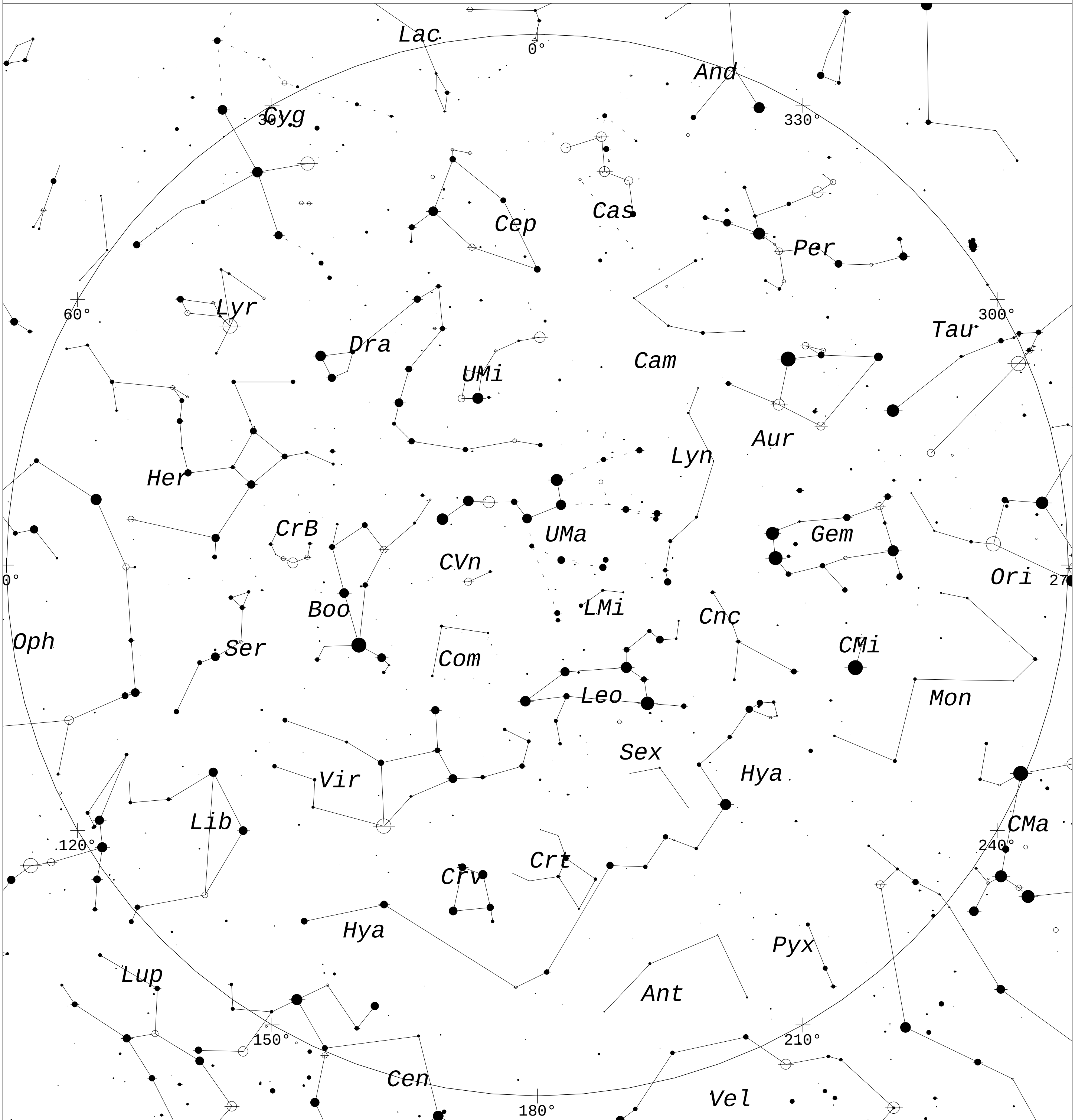
The Peterborough Astronomical Association meets every second Friday at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **7:30 pm**.



CALENDAR OF EVENTS

May 3, 2002, 7:30 pm	**General Meeting** — TBA
May 4, 2002	**Last Quarter (☾), Mercury at Greatest Elongation East (21 degrees)**
May 5, 2002	**Eta–Aquarid Meteor Shower peaks at 12 am**
May 12, 2002	**New Moon (●)**
May 17, 2002, 7:30 pm	**General Meeting** — TBA
May 19, 2002	**First Quarter (☽)**
May 26, 2002	**Full Moon (○)**
May 31, 2002, 7:30 pm	**General Meeting** — TBA

May Skies



STARS

- <1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- >5

SYMBOLS

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

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

UTC: 02:00:00 2-May-2002
RA: 11h39m16s Dec: +43° 38' Field: 182.0°

Sidereal Time: 11:39:16
Julian Day: 2452396.5833