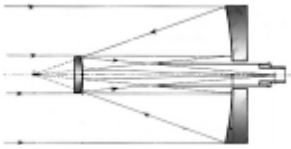
PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR



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Editorial

March is finally here, and hopefully, so is the better weather. There have been some wonderfully clear nights in February, but they were, for the most part, very cold and windy.

At the February 7th meeting, Jim Kendrick of Kendrick Astro Systems, came out to show off some of the latest astronomical equipment. This included a set of 20x80 binoculars (from Burgess Optical) for the amazing price of $239.00! After the meeting we had an opportunity to look through some of his equipment under reasonably clear skies. Personally, I was so impressed with the performance of the 20x80 binoculars, I went out and bought a pair last week. I would highly recommend looking into these if you are in the market for a good pair of binoculars. Because of the magnification, however, you will have to mount them on a tripod.

The February 21st meeting brought out some of the most enthusiastic club members to discuss possible future directions of the club. There were some interesting discussions on various topics associated with the survey that was passed out at the previous meeting. Despite the varied opinions (and heated debates) on such topics as *"Shall we charge fees?"*, *"Do we need an Observatory?" or "Why do we need a survey in the first place?"*, I think we all came away with a much better understanding of what being part of this club means to other members besides ourselves. One important point that was realized during this meeting was that there are small subgroups within the club doing their own thing, and more communication was needed to make the whole group aware of what these activities are and how to get involved. I see *"The Reflector"*, along with announcements at our meetings, taking on a key roles in making this information available for all. A summary of the results of the survey is included in this issue, and I am sure you will find them interesting, and in some cases surprising. For those who also want the raw data (in Excel), please see me and I will e-mail you a copy of the results. At a future meeting, we will discuss the results and determine what path forward (if any) will be taken to address the issues that are of greatest concern to our members.

The past month (Feb 7th), a team at NASA tried to raise the Pioneer 10 spacecraft for the last time. Launched in 1972, it has recently faded away in silence, as it's onboard radioisotope battery (which is similar to a pacemaker battery, just larger) failed. The voltage it produces fell below the level required to send back communications to earth. The last signal received from it came on Jan. 22. This spacecraft outlived its design life of 21 months. In 1983, it became the first man-made object to leave the solar system when it passed the orbit of distant Pluto. It carries a gold plated aluminum plaque engraved with a picture of its creators and a map showing the Earth's location in the solar system. It also includes the sun's location relative to it's nearest neighbours. The spacecraft is heading towards the star Aldebaran (65 light-years away) in the constellation Taurus. It will take 2 million years to reach it. Voyager's I and II are also on their way outside the solar system and are currently still functioning.

Pioneer 10— Launched in 1972, it became the first man-made object to leave the solar system in 1983.

Clear Skies

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Inside This Issue

Meet Frank Hancock, The Other PAA Founding Member

Frank Hancock's interest in astronomy has its roots in the fertile soil of Redvers, Saskatchewan. Frank still vividly remembers the pristine blue daytime sky and the sparkling starlit nights of his childhood. He says you can credit them for his being fascinated by the stars at an early age.

A benevolent aunt in England also encouraged Frank's interest in stargazing. She shared Frank's interest in astronomy and would regularly send him books on astronomy. Frank recalls that these were a rare treat during the tough times of the depression years on the Prairie.

Further adding to Frank's fascination with astronomy was his father's tale of how a person could actually see Halley's Comet – circa 1910 – in the daytime from downtown London. And to this day, Frank claims to have seen every naked eye comet since 1930.

Frank eventually acquired his first telescope (a spyglass) and binoculars – courtesy of the Canadian Forces. It was about this time – 1942 – that he also moved to Peterborough, Ontario where he has resided ever since. By the way, Frank still has those binoculars. They're 10x50's and are still serving him faithfully.

In 1970, Frank joined a high school student named Dave Duffus, along with Mike Junkin to lay the foundations for what is now The Peterborough Astronomical Association. During those days, they and their fellow members met in a number of different quarters. Lady Blackburn house, an out-college house, first served as the PAA headquarters. Then came a number of other addresses, such as the old Teacher's College and a place called Schivenflugg's Office, to name but two.

Frank recalls that during the early days, Harry Adams taught beginning astronomy for the club. At that time it wasn't unusual to break after a meeting and Harry would teach as many as 10 kids the basics of astronomy. He also remembers how he used to take his gas powered generator to Nicholls Oval where he would set up the 16 mm projector to show the public films circulated by NASA and various aerospace manufacturers. That's right, projectors and film!!

Frank and Jean Hancock at last Summer's PAA Star Party

In addition to being a founding member, Frank once served as the treasurer for the PAA. He has also owned 5-inch and 8-inch Celestron telescopes, in addition to his army-issue binoculars and another scope, which he co-owned with Dave Duffus. At one time the club had an observatory on a piece of his property. Unfortunately it became part of a land sale, though Frank says Colin Cross still has part of the old observatory. Perhaps we should go check it out – just to reach out and touch a piece of club history.

Today, Frank lists comets, the moon and meteor showers as his primary interests in astronomy. And he still fondly recalls sitting out with other members – each facing a different direction – counting meteors in the dark of night. Frank continues to be a regular at club meetings and introduced some of the newer members to his lovely bride, Jean at last August's PAA Observing Run.

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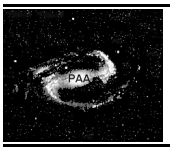

Peterborough Astronomical Association

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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2003 PAA Survey Results

At the February 7th meeting, the membership was presented with a survey. Here is a summary of the results.

The results we calculated as follows: Where the question was a "yes or no" type of question, the percentage of yes votes was divided by the number of respondents for that question. The percentage of respondents to a particular question is shown in brackets at the end of the question. For example if 15/20 of the surveys received answered a question than (75% responded) appears after the question.

For questions where a single check box was ticked to indicate a desired choice, these results were ranked, with the most popular as choice #1 and the least popular as the last choice in the list.

There were a total of 20 surveys received. The results are summarized per section in the questionnaire.

Section 1: Meeting Structure

61.1% of the respondents want to continue with bi-weekly meetings. (90% responded)
65% wanted to keep our relaxed meeting format (100% responded)
90% wanted a "What's Up in the Sky Tonight" presentation at least one of the monthly meetings (100% responded)

Comments received on this section were as follows:

What if you made the meeting an 8 pm start had a social for 1/2 hr before then after part of the meeting a break then return to complete the meeting.

Continue to have observation after the meeting (weather permitting). Continue to be patient with slack new members like me!

I know it is hard to get speakers and some people might feel that each meeting should have something to offer, but I don't expect that. I am happy to go and just listen to other members chat about stuff.

Need "Little" more structure. If we cut meetings back to one per month then there is not enough opportunity for those that cannot make every meeting. If you miss one meeting, than it is 2 months before you can get to another.

Schedule every other meeting as an Observing Night (those closest to the new moon)

We need a balance of speakers – some talking telescopes and stargazing and some explaining what we know about the universe and talking cosmology.

We were discouraged at the first few times my husband and I came out. We didn't know anyone and it seemed to be very informal – in fact very little astronomy was discussed. Personally I prefer a structured meeting. If I give up personal time to attend a meeting I would prefer to know/feel I'm making good use of my time. I would like to come away with a feeling I've learnt something or motivated to do something more.

I believe we need some sort of hybrid meeting that has some formal aspect to it (announcements, club business, speakers etc.), and a less formal or social aspect (where we shoot the breeze) – perhaps at the end of the meeting. I also think that after the meeting is over, members should be invited out the local watering hole (or Tim's if most prefer). I have found that this was often the glue that held most other successful organizations together.

Section 2: Club Activities

The three most popular Club Activities chosen, in order, are as follows:

1. Continue to have regular guest speakers at our meetings.
2. Have more observing nights such as the one last fall at Don MacDonald's observatory
3. Have more club outings like Trips etc.

Comments received on this section were as follows:

Guest speakers are nice to have but I know it is not easy asking and getting people, so it is not an expectation. It is appreciated though. Perhaps once a year some people might be able to go on a drive somewhere special, so it would be nice to offer it. Observing nights at someone's place are always appreciated.

All of the above are great ideas however fitting all of them in over the course of a year is quite a challenge. As you know some of these are already being done.

All the above are great goals – we need to prioritize them and all take time. We can do it all, but frequency is the issue. Organizing one big trip a year will be lots; having 1 to 4 public viewing nights is lots. Perhaps we need one event per season? School programs or any education would be great. It is great to use members (and non-members) observatories. If they get more use, it takes the pressure off the club needing a facility. We should try and make arrangements/agreements for member access to private facilities.

Try to have information on any guest speakers a month ahead so most people can plan for the event.

Section 3: Club Newsletter

100% of the respondents wanted *"The Reflector"* stay the way it is with articles on members, club activities and a variety of astronomy subjects. (90% responded)
Comments received on this section were as follows:

Maybe we should try bi-monthly issues or even quarterly.

I used to do a newsletter for another group and know that is takes a lot of time and you don't hear much appreciation for it. But I do like reading it in the

format it is in, with articles by members and stuff about the sky.

I like the way it has developed. I like some sort of what has become "regular", but just never know what might be in the next issue. Would be nice to hear from more members. Almost anything goes is good. If too structured then less will possibly contribute.

The Reflector is the best and most comprehensive newsletter I have ever received from any organization.

Enter the newsletter into any contests for recognition of outstanding newsletters, especially considering the small size of PAA. It is great to have it online. It should be shared with a wider audience such as the RASC.

I am happy to see that the newsletter is appreciated by most members (and even some non-members) and serves a purpose for the club. It just goes to show what can be accomplished by this club.

Section 4: Helping Hands

We had a good overall response to the various "Helping Hands" suggestions. Various members indicated that they would be willing to present something at a meeting or write an article for "*The Reflector*" or help out in other ways when time allows. Understandably, many people do not have the time or the resources to do much, but I hope that you all can help in whatever way you can. Remember it is your club!

Section 5: To Due or Not To Due?

85% of the respondents (100% responded) thought we should charge yearly dues in order to support getting speakers and other club functions. The most popular choice for a fee was $50 / year. A weighted average fee came to about $42.37 /year. This rate is comparable to memberships in the RASC or other astronomy clubs in Canada. Obviously this topic will need some more discussion at a future meeting.

Comments received on this section were as follows:

I'd feel much better if we do charge dues so we can cover expenses fairly.

I feel that payment up front for scheduled events requiring funding and if enough is not collected then the event cancelled.

I think we need to start "slow and low". This is a big move for a club that has been charging nothing! I would hate to scare off anyone.

I have many interests and belong to several groups, which already cost me money to support.

In order to do more, we need to collect some kind of fee, if for no other reason than to continue to bring in more fantastic speakers. On the other hand I do not see any reason why we would need to restrict meetings to members only. We could use other things as incentives for joining (e.g., newsletter, voting rights, participating in projects etc.). If we decide to collect fees we should establish a fee structure that includes reduced fees for students (both university and high-school) and have special family membership rates.

There should be a separate fee to participate in the summer "get-together" to cover port-o-potty etc.

The (membership) fee should be used to cover guest speakers

Why not follow lead of business – and offer mileage compensation ($0.15/km or 0.25/km if covering wear and tear)

Paraphrasing Groucho Marx – "I tend not to value membership in an organization that let me join for free." Membership should have its privileges – like free admission to lectures and events while the public pays a modest fee

A "toonie" for each meeting for potential new members until they decide to join the club

Section 6: Future Directions

88.2% of the respondents thought that the club should become a non-profit organization (85% responded)
53.8 % of the respondents thought we should pursue building a club observatory (65% responded)
70.6% of the respondents thought the club should pursue becoming a centre of the RASC (85% responded)

Comments received on this section were as follows:

It is easiest if we charge dues from Jan. to Dec. for everybody. When new person joins, they pay a percentage of the year depending on how many months are left in the year. I think in this age of lawsuits, it is very important to protect ourselves from being sued when we invite the public to observing nights (especially since it is dark and children come as well). The cost of joining RASC would be well worth it just from an insurance point of view, let alone all the other benefits.

We already have several members with observatories—lets use them!

I think all three of these sound good, but because my current situation keeps me on the periphery, I don't feel comfortable about supporting these initiatives without being able to contribute more time.

I feel that we should start looking beyond what we are now. Becoming a non-profit organization opens up so many more doors for the club. Ask yourself two questions: 1.) What is it you want to get out of an <u>astronomy</u> club?, and 2.) What are you doing to make it happen?

Becoming a non-profit organization makes sense, but will add structure to meetings that some may resist. We need to keep it simple.

The cost of the benefits (Sky News, Handbook etc.) of joining the RASC (as a centre) is almost the same as subscribing to these separately.

Trent has recently purchased a high-end

CCD for use with their 16-inch scope. Perhaps we could join forces with Trent University!

Section 7: Other

100% of the respondents thought we should have a Summer Star Party (95% responded).

Sixteen people thought that the club should continue to offer the *RASC Handbooks* & *RASC Calendars.*

Nine people would consider a subscription to *Sky and Telescope* through the club (to get a discount), Unfortunately this is one less than needed by Sky Publishing to get the discount.

76.9% thought we should have a dinner night once a year (70% responded).

80% of the respondents thought we should start some sort of project (70.5% responded)

Of the choices the ranking went as follows:

1. Astro-photography
2. Building a small radio telescope
3. Build a small Dobsonian
4. Building a CCD camera
5. Meteor observing
6. Comet hunting
7. Variable star research

Anything that would raise the club's profile in the community such as educational programs for schools, public observing nights, mall displays would be good. And they build bonds between club members as a bonus.

Of the choices for workshops, all the topics were popular. They ranked as follows:

1. Finding your way around the night sky
2. Astro-photography
3. Using your telescope
4. Binocular astronomy
5. Planetary Observing
6. Using star charts
7. Recording or Sketching your observations.
8. Telescope making
9. Variable star observing

The best thing for me would be to observe alongside more experienced members. I have a scope and the interest but not enough practical experience

A theoretical topic where different theories in cosmology/astronomy could be explained and discussed. Also, the mathematical basis (formulas) could be explained by people who are knowledgeable about the equations. Perhaps we could pick a topic to talk about a few weeks in advance. People could go home and research it and then discuss it at a meeting. An example might be explaining and discussing Einstein's theories or even basic things like why planets orbit in ellipses and how it was figured out, and the equations you use. This might be similar to a course given in university about the history of astronomy for science students.

I would like a workshop on "Dealing with light pollution (in an organized way) and "How to Tune your Scope".

Data compiled and analyzed by:

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On the Event Horizon

PAA Moon Launch set for March 21st.

Remember the first moon landing? Those flickering television images of the first men on the moon? The famous footprint? PAA member **Rob Fisher** is going to rocket us back to those days via a multi-media presentation at our March 21st meeting. Rob's presentation will involve newspaper images, television clips and interviews.

PAA Member Rob Fisher

Seeing as how multi-media presentations are Rob's profession and astronomy is his major interest, this will be a terrific show. Don't miss it.

Visitors From Outer Space will Attend April 4th PAA Meeting.

That's the night **Graham Wilson** of Turnstone Geological Services will entertain and enlighten us with a presentation on Meteorites. Mr. Wilson is a noted geologist, an excellent speaker and has traveled the world lecturing and collecting rock specimens of all types. In addition to some excellent slides, Mr. Wilson will also introduce us to some actual alien visitors in the form of meteorites. He'll also show us a bit about "meteor wrongs" – those rocky bits that look so alien, but are actually life-long residents of planet Earth.

A few lucky PAA members had a sneak preview of Mr. Wilson's presentation at a recent Peterborough Rock & Fossil Club meeting – and everyone was impressed. The April 4th presentation will be different in that Graham is going to tailor it to match the interests of amateur astronomers. This promises to be a superb event and we urge everyone to attend.

The Sky This Month

MERCURY:

Mercury is not well placed for viewing this month.

VENUS:

Venus is now low in the morning sky. Try and catch it if you wake up before the sun.

MARS:

Mars will be visible this month in the early morning hours. It will go between the Lagoon and Trifid Nebulae (in Sagittarius) on March 5th, and 6th.

JUPITER:

Jupiter will be in Cancer and appears as the brightest object visible in the evening sky.

SATURN:

Saturn will be visible near the Taurus-Gemini boundary, not far away from the Crab Nebula (M1). The rings are well oriented for viewing the Cassini Division

URANUS & NEPTUNE:

Uranus and Neptune are not visible this month

PLUTO:

Pluto will be visible in the early morning hours this month. It is located in Ophiuchus and is best seen in the summer months. You will need to a finder chart like those published in *Sky & Telescope* or the *RASC Observer's Handbook* to find Pluto.

METEOR SHOWERS:

There are no major showers this month, however there are several minor showers visible from the northern hemisphere. For more information on these, see *http://comets.amsmeteors.org/meteors/calendar.html*.

High Flying Auroras!

If you are lucky enough to be flying for work or pleasure and it happens to be in the evening hours, here is a tip that has paid off for me over the years. Assuming you get to the airline counter well enough in advance to have a choice of seats, take a moment and consider the direction of your intended flight in relation to the North Star (Polaris). I have done this over the years and on several occasions have been rewarded by a unique display of Northern Lights (Aurora Borealis). Auroras are a treat at any time or place, but at thousands of feet above the earth and traveling at 500 mph,…wow!

The first time I had the pleasure of such a display, I was flying from Hamilton to Winnipeg on March 20, 2001. It was a late flight aboard a WestJet 737 Boeing. I happened to have a north side seat and we were west of Thunder Bay around 9:45 p.m. when I looked out over the wing tip and noticed a strangely familiar glow in the distant curve of the horizon. We were at 35,000 feet and traveling 500 mph and dance of the auroras had started. I was fortunate enough to have my 35 mm camera and a tripod with me on this flight, so I started taking pictures like I would on terra firma. With the camera pressed against the window and the camera locked open for 20 to 40 second time exposures I was able to register images that are quite unique. Considering that the jet was floating up and down a bit during the exposures, I was pleased with the results.

The shot below was taken as the display intensified significantly and we passed off the community of Dryden. Lights on the ground show up as golden streaks of light during time exposures of this kind. The display was magnificent! You can really get sense of what the earth orbiting astronauts must feel like when they see such things from space. The night sky is black to the horizon as is the ground below, except for the stars in the heavens and the few lights on the ground that pock out of the dark. I have seen the odd photo taken from space of the auroras and they had nothing on this display!

My first shot (shown on the next page) shows the wing tip of the jet and the initial glow in the distance of the auroras. They slowly moved and danced in different shapes as the minutes rolled by.

My second auroral experience from the air, was just last week (Feb.26th) as I flew back to Hamilton from Thunder Bay on another WestJet flight. This time we

Auroral Activity as seen from an airplane on March 20, 2001

More Auroral Activity—In this photo you can even see the wing

were at about 41,000 feet and I had asked to be seated on the north facing side of the jet, just in case. Well, it happened again! It was not nearly as spectacular, but still a unique experience to say the least. It was only about 9:00 p.m. and we were close to Sault Ste. Marie when I looked out the window and could see the Big Dipper standing on it's handle and below were the lights of the Sault, but there appeared to be a bank of cloud separately them. I looked out a few seconds later and noticed that the cloudbank had really not moved. This could not be if we were traveling at 500 mph. I watched more intently as the city lights below slowly moved passed, the "clouds" slowly changed shapes (but not colour). They were auroras all right. I tried to take some digital pictures this time, but to no avail. They were just not registering, no matter what I did.

The lesson learned through all this, is plan your next trip by air. Consider what could happen while in route. You may be well rewarded and if you are prepared to record the memory as well, it will be a bonus!

Bon Voyage!

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Meet Cancer the Crab. Famous, but Seldom Seen

Cancer the crab is the dimmest constellation in the zodiac. In fact, from a dark sky site I find it easier to see one of Cancer's two resident star clusters, M44, than the five stars that define the constellation's outline. M44 is a naked eye, open cluster that is easily seen as a misty patch to the left of and below the stars Castor and Pollux. Connecting the dots that make up the constellation takes a bit more concentration.

The defining stars of Cancer range from 3rd magnitude down to magnitude 6.6. But despite the fact that Cancer is virtually impossible to see under anything other than dark rural skies, it is one of the more familiar constellations. This is a fact that it owes to more to Earthly geography than the legends of the ancient Greeks and Romans.

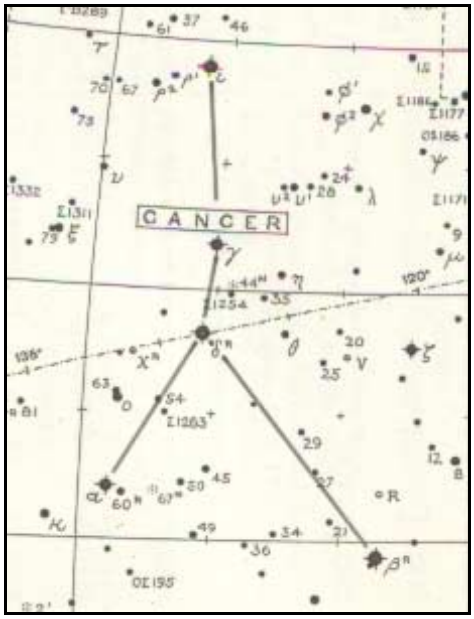
That's because about 2,500 years ago the Sun reached its most northerly position in the sky (June 21st – now called the summer solstice) when it was in front of this group of stars. Thus, on that date 2,500 years ago the sun was directly over head at noon if you were standing at latitude 23.5 degrees north of the equator. In time, that latitude was dubbed The Tropic of Cancer. And the name stuck, even though the Earth's wobble (precession) now makes the constellation Gemini the high point of the Sun's northern journey on June 21st. The Tropic of Gemini anyone? Um, no thanks, Norman Mailer's once banned novel just wouldn't seem the same.

Cancer's brightest star cluster, M44, goes by two other names. In ancient times this fuzzy sprinkle was known as Praesepe. In those days, some thought that the light patch was a thin spot in heaven's floor. It was even postulated that the souls of men passed through this thin spot as they descended to Earth to be born. And you thought it was storks!

M44—The Beehive

Galileo also used Praesepe to make the point that Aristotle's vision of the universe was wrong. At the time this misty patch was considered a puff of interstellar gas. But when Galileo turned his telescope on it, he discovered that it was a cluster of stars. This proved that there were more stars than the eye could see, and that the Aristotelian view was no longer valid.

Lying at a distance of 515 light years, Praesepe is also known as The Beehive Cluster. It consists of about 75 visible stars. To view it, binoculars or a low power, wide-field telescope, are recommended. About 15x gives a pleasing view with plenty of sky as a background. But there's more lurking in the dim constellation's depths.



Cancer—The Crab

Yet another open cluster, M65, also calls the aquatic critter its home. This 6th magnitude sprinkle of about 65 stars can be found just to the right of the double star Acubens (α-Cnc). Much dimmer than the Beehive, M65 is also considerably more distant at 2,700 light years.

There are no notable galaxies or nebulae in Cancer. And though you might logically think that the Crab Nebula resides there, it is actually in the constellation Taurus. The nebula simply got its moniker from its crab-like appearance in early photographs – much like the North American Nebula.

Cancer should be well up by dark on March evenings. So bundle up, break out the binoculars and have a look. M44 is an easy find. And it's even more rewarding.

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Off the Beaten Path

This time of year is perfect for galaxy hunting. The famous Virgo galaxy cluster (of which our galaxy is a part) is now visible in the evening after the sky gets dark. Here are a few interesting objects to observe in this area. You will need a detailed chart of the area (like Sky Atlas 2000.0® or Astro-Cards®) to find these objects, as there is a lot out there to confuse you.

NGC4565—Needle Galaxy

NGC4565 – This is the classic "edge-on" galaxy that you see in photographs. Sometimes called the "Needle Galaxy", it is located in Coma Berenices, east of the star 17-Com in coma star cluster.

M98 – This is a 10th magnitude large spiral galaxy that is almost edge on in appearance. It is located ½ degree west of 6-Com.

M100 – This is the brightest galaxy in the Virgo Cluster at magnitude 9.4. This puts it easily within the reach of most amateur scopes. It is located east of M98 a few degrees away.

M64–Black Eyed Galaxy

M64 - Known as the "Black-Eyed" galaxy because of a large dust lane that obscures part of it. Located northeast of the star 35-Com, it is well worth the hunt to find it.

M87 –This elliptical galaxy is located near the Virgo-Coma Berenices boundary. This is a massive galaxy

M87—Heart of the Virgo Cluster

located at the heart of the Virgo Cluster. It contains more stars than either the Milky Way or the Andromeda Galaxy. It is believed that massive black holes exist at the center of M87, which are responsible for intense jet of particles emitted from its core. It has probably consumed many galaxies in the past to get to the size it is today.

M53 – Much closer to home, this globular cluster located a degree away from α-Com. It is a rich compact object and is fairly bright at magnitude 7.7

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Running Rings Around Saturn

Just about everyone is familiar with Saturn's stunning rings. We've all seen the breathtaking photographs taken by the Hubble Space Telescope. And many of us have viewed them "live" through our telescopes. Yet few of us know much about them.

For instance, did you know that Saturn's rings are surprisingly thin? Fact is, if we could shrink them down to a disk about 100 yards in diameter, their thickness would scale down to that of a single newspaper page.

Edge to edge, Saturn's rings are about 270,000 kilometers across. That's roughly 2/3 the distance from Earth to the Moon. Their estimated thickness is 1.6 kilometers, though I have read some

Saturn—The Ringed Planet

figures as low as 30 meters.

From Saturn's distance the rings appear to us as a solid surface. They are, in fact, comprised of trillions of chunks of ice and dust, all orbiting the planet in an orderly manner. The innermost particles circle the planet in about 4 hours. The outer bits take 14 hours to complete one lap around the gas giant. These mini-moons are thought to be chunks of extra water-ice or other material that didn't coalesce into planets or larger moons.

When we refer to Saturn's rings we are talking 7 rings in all. On a night of good seeing we can see the 3 major rings through our telescopes. Named the A, B and C rings, they are each separated by a darker gap. The most noticeable of these is the Cassini division, name after Gian Cassini, the French-Italian astronomer who first observed them in 1670. This gap measures about 1,500 km in width. U.S. space probes have since upped our ring count from 3 to 7. And who knows what new delights the Huygens/Cassini probe will discover when it arrives at Saturn in 2004!

Saturn is now one of the more prominent residents of our night sky. Located in the constellation Taurus and riding high in the early evening, the planet is perfectly positioned for observing. Presently its rings are tilted towards us and present a dramatic view. This advantageous tilt also makes the planet appear even brighter in the February sky.

To see the rings you'll need a small telescope operating at about 40 power (40X). Of course more is better as long as the seeing is steady. Consult your *Sky & Telescope* charts and chances are you'll also be able to make out a couple of Saturn's moons. With any luck we'll get a clear night and an observing session on Armour Hill to coincide in the next couple of months. That way members without scopes will have the opportunity to see our ringed neighbour.

Saturn by the numbers

Mean distance from the Sun	1,427 million km (9.5388 a.u.)
Orbital Period	29.46 years
Rotational Period at Equator	10 hours, 39 minutes
Axial tilt	26.73 degrees
Escape Velocity	35.5 km/s
Chemical Composition	H, He
Largest Moons	Titan, Tethys, Dione, Rhea, Mimas, Hyperion and Enceladus

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A Brief History of Space Flight
Part 2: Manned Fight

Early on in the Space Age, the Soviets began focusing on the moon and the rest of the solar system. On 2 January 1959, the Luna 1 probe came within 5 000 km of the moon's surface, but unfortunately it became the first artificial satellite of the Sun. Later, Luna 2 was launched on 12 September 1959, and landed near the crater Archimedes. A third probe, Luna 3, was the first satellite to photograph the far side of the moon. Its magnetic measurements also revealed that the moon has little or no magnetic field.

On February 1961, the first attempt to send a satellite to another planet was made. Venera 1 was sent to Venus, Earth's closest neighbour. Unfortunately Venera 1 failed because it's radio communications link went down (things don't change much do they!). The Soviets later sent other satellites mainly to investigate radiation shielding for a possible manned flight.

When the Soviets were finally prepared to try manned flight, they had to choose between a ballistic flight (parabolic trajectory) or an orbital flight. It was decided that an orbital flight would have more propaganda value so on 12 April 1961, Yuri Gargarin was launched from the Balconour Cosmodrome in Vostok 1. The entire flight lasted only 108 minutes with one complete orbit. On 11 August 1962, Vostok 3 and 4 were launched into similar orbits with the two ships coming as close as 6.5 km. This demonstrated a solution to the problems of two spaceships in close orbit with very high precision. This mission also demonstrated that two-way communication was possible in space, without the benefit of our ionosphere.

Like those in the USSR, the rockets used in America were derivatives of

A V-2 Rocket Taking Off

Germany's V-2 rocket. They were tested in New Mexico in hopes of making an intercontinental ballistic missile (ICBM). Safety precautions were almost non-existent. One V-2 made an unauthorized visit to Mexico, landing on a cemetery in Ciudad Juarez! An international incident was averted only because it was Fiesta time, and the revelers roared with appreciation at the new firework.

Werner Von Braun, who was employed by the US Army, later joined the newly formed space administration NASA in 1959. There he started work on "Project Mercury", which was to put the first American in space. The Mercury spacecraft had to withstand the shocks of take off, the heat of re-entry, and the orbit in between. At first, mice and then chimpanzees were sent up to determine the effects of their ordeal. While project Mercury was on, NASA was also developing it's moon landing program Apollo. Little more than a month after Gargarin's flight, President John F. Kennedy gave his historic speech; "I believe that this Nation should commit itself to achieving the goal, before the decade is out, of landing a man on the moon and returning him safely to earth". On 5 May 1961, Alan B. Shepard became the first American in space. He flew in a Mercury-Redstone rocket combination. He did not however go into orbit but made only a ballistic shot. He experienced only about 5 minutes of weightlessness, and the entire trip lasted 15 minutes. Later on 20 February 1962, John Glenn Jr. became the first American to orbit the earth. He made only 3 orbits. Instead of the Mercury-Redstone combination of Shepard's flight, "Friendship 7" was launched in a Mercury-Atlas configuration. Atlas rockets are still used today to place payloads in orbit between shuttle flights, because of their reliability. When Glenn was re-entering the earth's atmosphere, his capsule tumbled due to a defective thruster and a wandering gyroscope. He had to take control of his tumbling ship and re-enter manually. This proved to disbelievers that man was not just a passenger in space, but was needed to control the vehicle if something went wrong. Project Mercury ended with Gordon Cooper's flight in “Faith 7” on 15 May 1963. He made 21 orbits.

Alan Sheppard takes off on May 5, 1961 in a Mercury-Redstone Rocket

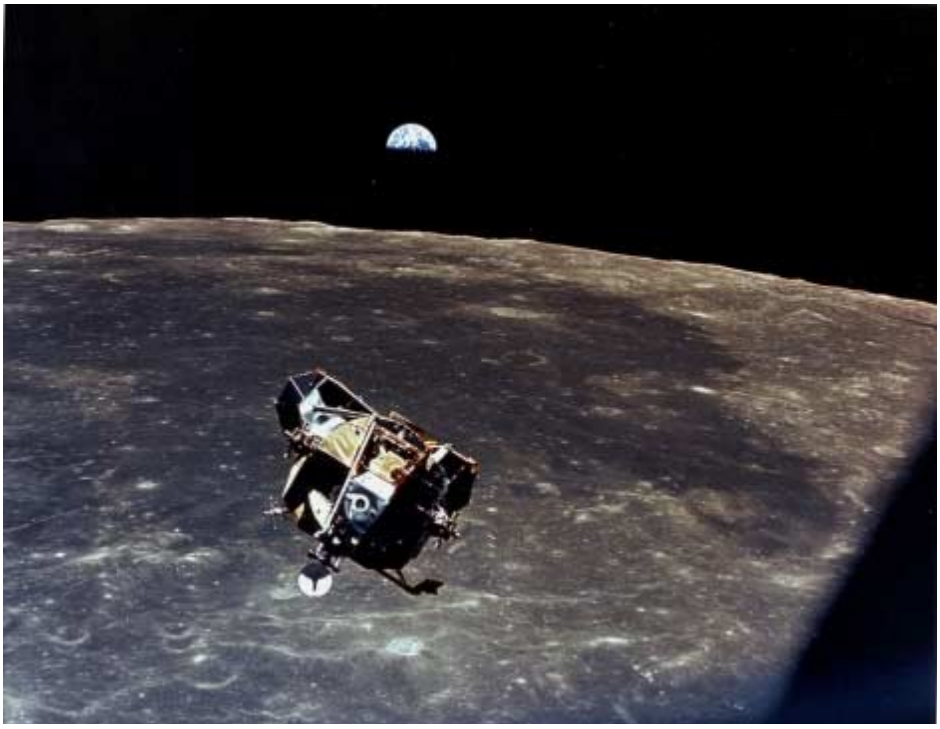
NASA then began its second stage for a moon-landing, project Gemini. The Gemini capsule would hold two pilots with enough fuel and O_2 for an extended stay in orbit. The purpose of Gemini was to determine how to fly spacecraft towards an unmanned target, dock, undock and change orbits. On 23 March 1965, Gus Grissom and John Young flew the first Gemini Spacecraft and blasted into orbit using a Titan II booster. As time went on, Gemini spacecraft, along with Russian Voskhod spacecraft, demonstrated man's ability to stay in space for an extended period of time.

On 25 October 1965, Gemini 6 was to rendezvous with the unmanned target Agena. The Agena module failed to fire it's outer engine and disintegrated in the atmosphere. Instead NASA decided to fly Gemini 6 and 7 together. The two crafts managed to float side by side, and at one time, only had a 30 cm clearance. Gemini 7 had spent 14 days in orbit before it came down again.

Disaster stuck the space program on 23 January 1967. Gus Grissom, Ed White and Roger Chaffee were testing out the Apollo 204 capsule and perished because of an electrical short in a pure O_2 environment. After this incident, America's spacecraft changed from a pure O_2 environment to one of reduced concentration.

Gemini 7 (photo taken from Gemini 6 in space)

During this race to the moon, various probes were sent to the moon to determine what astronauts would expect when they got there. The first successful craft was Luna 3 launched by the Soviet Union in 1959. It was the first craft to photograph the far side of the moon. On 23 February 1964, Ranger 7 was launched and successfully photographed the moon. In February 1966, the Soviet Luna 9 was the first probe to soft land on the moon and sent back-televised photographs of earth. Later on 30 May 1966, Surveyor 1 from the U.S. also soft-landed on the moon successfully. On 15 September 1968, Zond 5 was launched from the Soviet Union on a secret mission. The craft looped around the moon and returned back to earth for a soft landing. An on board tape recorder radioed back data, and even a recorded voice of a Russian cosmonaut. The capsule landed in the Indian Ocean and was shown to be the same size as the re-entry capsule of a manned Soyuz ship. On board were turtles, to see if there were any harmful side effects of sending someone to the moon. On 11 October 1968, Apollo 7 lifted off launch pad #34 at Cape Canaveral, Florida. This was the first operation flight of Von Braun's new Saturn 1B booster. The Saturn 1B ran on O_2 and Kerosene. Later on 21 December



The Lunar Excursion Module (LEM) docking with the Command Module

1968, Apollo 8 was launched with a Saturn V rocket, the most powerful booster ever fired. The Saturn V is 36 stories high and weighs 3 000 tons. Visitors to the Cape Canaveral Space Centre in Florida can see one stretched out in the front lawn. On 23 December 1968, Apollo 8 crossed the "Great Divide" when lunar gravity takes over from Earth's. On 24 December 1968, they were orbiting the moon 70 miles high. Later Apollo 9 was launched. Its mission was to fly the Lunar Excursion Module (LEM) that would eventually carry two astronauts from the command module to the moon. Once in Earth's orbit, "Gumdrop" (the name given to Apollo 9's command module) pulled away from "Spider" (the name of the LEM) and turned 180 degrees facing towards Spider, and docked. Explosive bolts holding the LEM inside its shroud were blown and the combination was put in a higher orbit. In May 1969, Apollo 10 made a voyage to the moon. They tested the LEM docking again and piloted the LEM, dubbed "Snoopy", to just within 10 miles of the moon's surface; and then returned to the command module "Charlie Brown". Now all the groundwork for a moon landing was in place.

Meanwhile in the Soviet Union, engineers were about to launch its 'super booster', the G-1, of its pad at Balconour. Within seconds of launch it exploded, destroying Russia's chance at any moon landing. It was later revealed, in Gorbechov's era of Glasnost, that the G-1 rocket never flew successfully. In addition, the planned lunar excursion module was little more than an enclosed bulldozer, with levers for controls and no computers. The Russians realized that America would succeed in it's first launch to the moon and they tried to downplay it's importance by landing a remote controlled probe Luna 15 to gather moon rocks from the surface and fly it back.

On 16 July 1969, Apollo 11 was launched. Its mission was to land on the moon! On 20 July 1969, Neil Armstrong and Buzz Aldrin landed their LEM, "Eagle" successfully on the moon's surface. This is probably the greatest day in the history of science. By 24 July 1969, the three astronauts were back at home, after spending less than 24 hours on the moon's surface.

In total there was only 6 attempts to land on the moon. As many may recall, Apollo 13 turned out to be a hair-raising experience for both its crew and the world. When they reached about midway between the earth and the moon, an explosion occurred in the service module. This resultant O_2 leak forced the crew had to retreat to the LEM until they could re-enter the earth's atmosphere. They had to swing around the moon and direct the ship back towards earth. On the 6th day of the flight the crew returned to the command module and jettisoned the crippled service module and LEM. As it turned out, the O_2 tank itself had been damaged during assembly years before.

Sadly, the last visit to the moon occurred in December 1972 in Apollo 17. After this, NASA concentrated on Skylab, America's first space station, and the design and building of the space shuttle.

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Astronomy in Philately

This month I will follow-up Charles Baetsen's, "A Brief History of Space Flight, Part 1: The Early Years", from last month's *Reflector*, with a few stamps from the past that illustrate some of the early achievements in space flight. The series I will be drawing from come from Poland.

Tsiolkovsky

In 1963 there was a set of stamps issued that were part of a "Conquest of Space" series. In this set is a stamp that shows Konstantin Tsiolkovsky's "Space Rocket" and rocket speed formula from

1903. You will recall he is the Russian space research pioneer that is known as the father of modern rocketry.

Sputnik and Explorer I

Then came the famous Sputnik I, Russia's first successful launch into space of an artificial satellite, on October 4, 1957. This stamp shows Sputnik and a diagram of its earth orbit. This design was used four times in 1957 alone, to send things into space.

Next in the series is the first U.S. satellite, Explorer I. This was launched 4 months after the Russians, on the 31st of January, 1958. This stamp illustrates the craft and its earth orbit too.

Laika

From 1964, there is a stamp from the "Publicize Space Research" set that depicts Laika, the first animal in space. Along with a nice profile of the dog, is a scene of the Vostok rocket on the launch pad that sent the Sputniks and Laika into space. Unfortunately, Laika did not survive her two days of orbiting in space. She died of heat exhaustion. Future flights of Sputnik with dogs would prove more successful though.

Read on in this month's *Reflector*, as Charles continues his History of Space Flight!

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Amazing Space

The term astronomical pertains to the heavens as well as the size of the numbers its study generates. Here are some more of the mind-boggling digits that come to us courtesy of professional astronomers. One look and you'll understand that it's no wonder they do a lot of their number crunching with super computers. And my Commodore 64 had trouble with the family budget!

A pulsar is the super-dense, spinning remains of a star that went supernova. Whirling at hundreds of revolutions per second, a pulsar is so dense that a thimble full of its material would weigh as much as all of Lake Erie.

How fast does a pulsar spin? Matter at the equator of PSR 1937 + 21 is whizzing about at nearly one tenth the speed of light. That would be about 30,000 kilometers per seconds. Who says heavy can't be fast?

A black hole with the mass of dear old planet Earth would only be the size of a golf ball. A black hole with the mass of the Sun would be no larger than the city limits of a town with a population of about 10,000. I guess that figures when you consider the fact that the Sun is about 1,300,000 times the mass of the Earth.

Quasars are thought to be the brilliant, high-energy cores of galaxies that collided 12 to 14 billion years ago. That would make them about 7 billion years older than planet Earth.

Astronomers think that most stars in our galaxy are about a billion years older than our Sun. If so, and there is intelligent life on a planet orbiting one of those older suns, its inhabitants would be about a billion years more advanced than we are. What difference does a billion years make? Well, a billion years ago the highest form of life on Earth was a worm. And two billion years prior to that, bacteria were the prime inhabitants of our planet.

Perhaps you've heard that the Planet Saturn has such a low density that it would actually float in water. That's true. Comprised mainly of hydrogen and helium, the entire planet has the approximate density of softwood. Now the only remaining question is, will it be your bathtub or mine?

The galaxy M87 is estimated to contain ten trillion stars. That's the number ten followed by twelve zeros – 10,000,000,000,000.

Cosmologist Stephen Hawking's book *A Brief History of Time* has sold millions of copies world wide. In fact, he has outsold Madonna's book on sex.

John Crossen
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**The data for this column was gleaned from a number of sources. Hey, you guys didn't think I was that smart, did you?*

A Date for Easter

This article originally appeared in the March 1996 issue of the Hamilton Amateur Astronomers newsletter, "Event Horizon". Re-printed with permission of the author.

In 1996, Easter fell on April 7. The last time it did that was only 11 years before, in 1985 and before that, in 1912 and in 1901. That's it for the 20th. Century. See any pattern yet? Not likely, as the grand cycle of Easter dates takes exactly 5,700,000 years to complete.

Easter is always the first Sunday after the full moon which occurs on or after the spring equinox. It sounds like an astronomical event, but it's not. The full

moon is reckoned according to an ancient Ecclesiastical calculation which seems to go all the way back to the Council of Nicaea in A.D. 325. Similarly, March 21 is always assumed to be the date of the equinox, when in fact, astronomically, it can occur a day or two earlier.

So the Moon is responsible for all this mess with the dates of Easter!

The earliest possible date for Easter is, therefore, March 22. This happens to be the rarest date, turning up on average only once every 210 years. The last time was in 1818, the next not until 2285. In fact, as many as 1887 years can elapse before a March 22 date repeats.

The most common date for Easter is April 19, occurring precisely 220 400 times in the grand cycle. On average, we have to wait just 11 years until an Easter date recurs, although the minimum interval is 5 years. This brings us back to our April 7 date. Although it occurs just twice in the this century, in 2075 and 2080, they are only the minimum of 5 years apart.

On the other hand, there are never less than 57 years between Easters on April 25, the latest of the 35 possible dates. The last was in 1943, the next in 2038. Fortunately, we just have to flip open a calendar to know when to dust off the Easter bonnet or buy a new one or when to plan the trip to Grandma's for Easter Sunday dinner.

Rob Roy
rroy@idirect.com

Classifieds

For Sale:

1.24" Diagonal for SCT Asking $50.00

Contact: Charles Baetsen
Phone: 905-983-8143
E-mail: va3ngc@rac.ca

For Sale:

8" Dobsonian Telescope for sale. The primary mirror is an 8" f/4.66 mirror with special coatings on it (Cr + Al + SiO). This mirror was made custom for me by Moonward Optics. The f/4.66 mirror gives this telescope a short (portable) size of 37". Also comes with Rigel Quik Finder for easy aiming of the scope. Asking $500.

Contact: Will Juodvalkis
Phone: 905-839-1151 x6767
E-mail: wjuodvalkis@yahoo.com

For Sale:

Various Eyepieces: 1.25" and 0.965"

- Meade 13.8 mm 1.25" Super Wide in excellent condition - $150.00
- Meade 32 mm Plossl – old 5-element design in pristine condition – $70

0.965 eyepieces

- Beautiful Takahashi 25 mm Orthoscopic hardly used - $70
- Excellent Celestron 7 mm Orthoscopic like new - $30
- Meade 0.965 2x Barlow lens - $35

-

Contact: Peter Lanscale
Phone: 905-985-5160

For Sale:

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!

For Sale:

70's vintage 4.5" Tasco reflector, Needs some work on the secondary.
Contact: Fred Fish
Phone: 742-1424
E-mail: dinogronk@myfastmail.com

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
4094 Squair Rd
Orono, ON
L0B 1M0

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

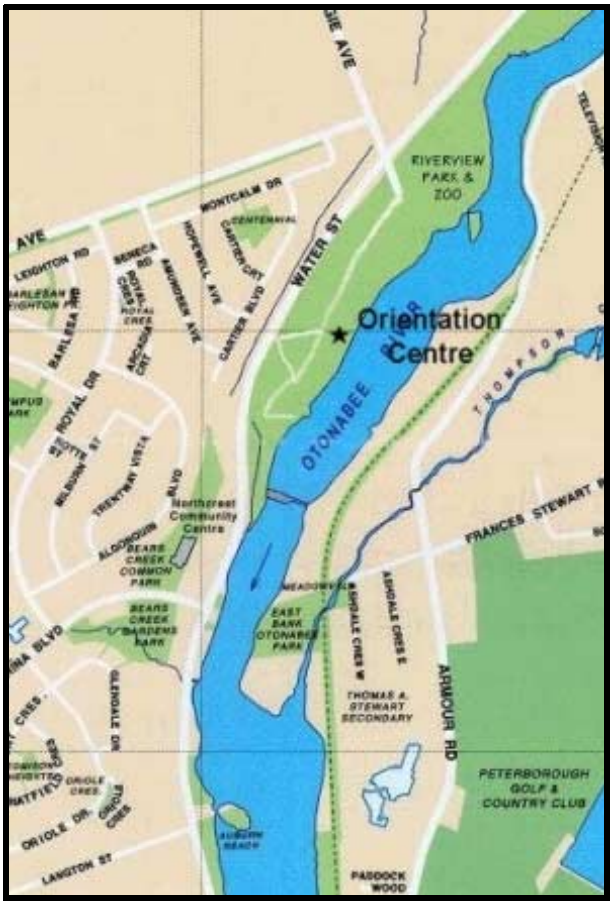
NEXT ISSUE'S DEADLINE IS

Mar. 31st, 2003

⌘

MEETINGS

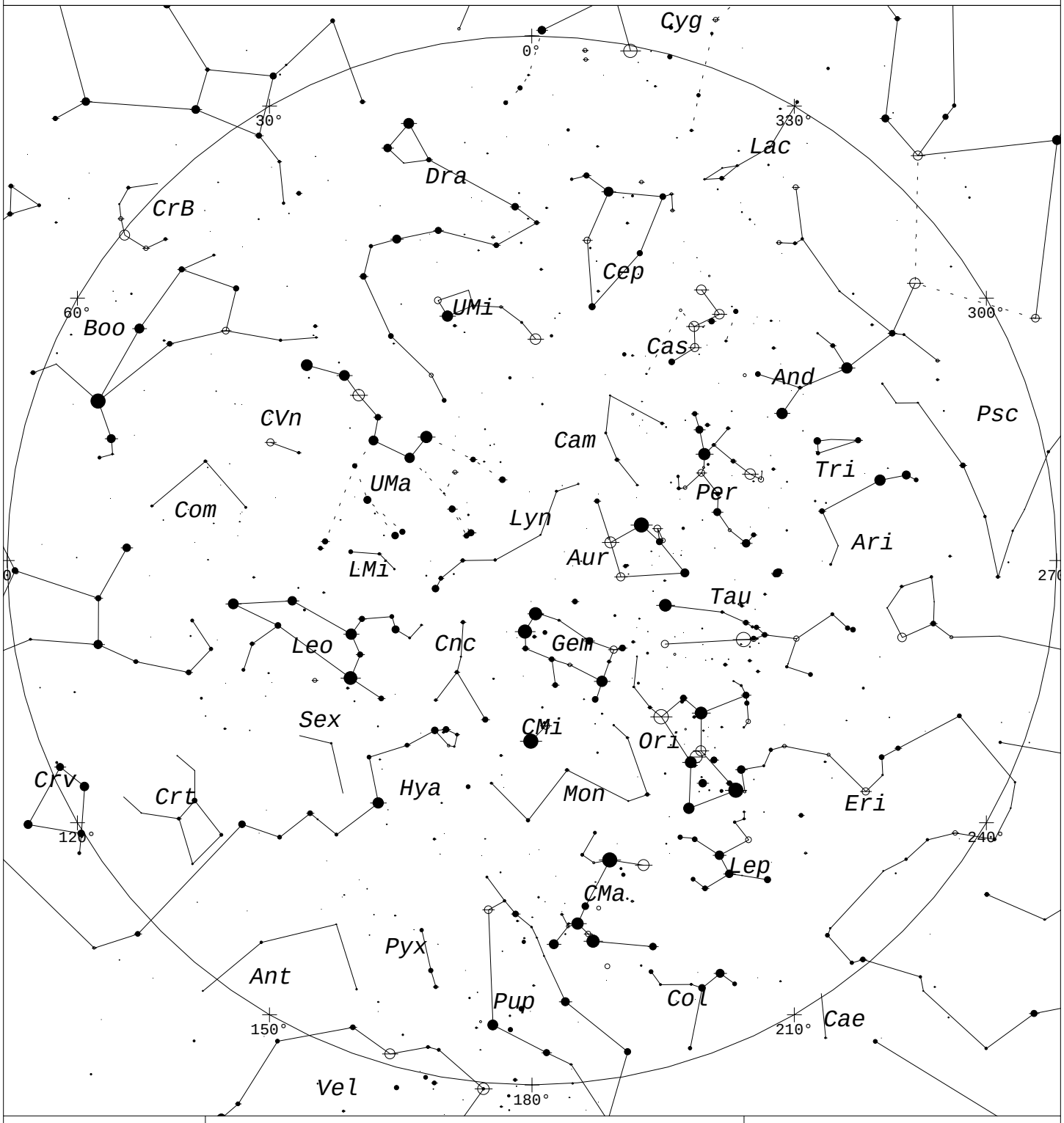
The Peterborough Astronomical Association meets every second Friday at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **7:30 pm**.



CALENDAR OF EVENTS

March 2, 2003	**New Moon (●)**
March 7, 2003	**General Meeting** — Observing Afterwards if clear!
March 11, 2003	**First Quarter (◑)**
March 18, 2003	**Full Moon (○)**
March 21, 2003	**General Meeting** — Rob Fisher is going to rocket us back to those days via a multi-media presentation
March 24, 2003	**Last Quarter (◐)**
April 4, 2003	**General Meeting** — Graham Wilson of Turnstone Geological Services will entertain and enlighten us with a presentation on Meteorites.

March 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-Mar-2002
Location: 43° 39' 0" N 75° 0' 0" W

UTC: 02:00:00 2-Mar-2002
RA: 7h38m46s Dec: +43° 38' Field: 182.0°

Sidereal Time: 07:38:46
Julian Day: 2452335.5833