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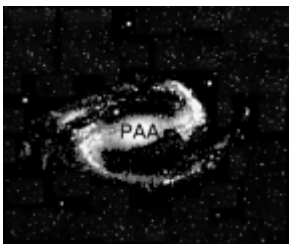
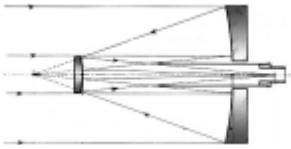


PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR



Volume 4, Issue 3 March 2005

Editorial

March is here, and shortly, the snow should melt and if you are like me, you will be more apt to go out under the stars than you did in February. I hope that this spring's weather turns out to be a lot better than last year's. Particularly for this year's Astronomy Day event in April.

On Saturday April 16, 2005, the Peterborough Centennial Museum and Archives and the PAA will be offering a public program of day events, and evening viewing for International Astronomy Day. The event will be free to the public. Astronomy Day activities will begin at noon, but we will be setting up at around 10:00 a.m. We have use of the theatre and pavilion, as well as a portable for coffee breaks and storing equipment for security. There will be a break at 5:00 for dinner, then we have our keynote speakers (Dan Bortolotti & Peter McMahon) at 7:30. After that, we will be star gazing, weather permitting. In order to pull off a successful public event such as this, we will need as much help as possible. If you can attend, even for an hour or so, that would be great. Contact John Crossen, if you would like to help out.

While we are waiting for some better observing weather to come our way, it is a good time to get our equipment in tip-top shape, or plan our next observing session. It is also a good time to upgrade or enhance what we have. Personally, I have a few of these type of projects on the go, that have been hanging around since last summer. I am sure most of you have as well.

Until next time—Clear Skies!
Charles W. Baetsen
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Rick Stankiewicz and club members show the sun to the public at last year's Astronomy Day event at Armour Hill. This year we will have the inflatable planetarium, and various presentations for the public.

Meeting Notes

Feb 4 Meeting:

The February 4th's gathering consisted of a mini-meeting in which Colin Cross substituted Comet Machholz for his usual constellation tour. Colin showed us where Comet Machholz would be located in the sky for the next couple of nights and then challenged us to find it during the observing session that followed.

John Crossen announced that we have secured a meeting room at Class Connections for February 18th. Our regular room at the Orientation Centre will be in

Inside This Issue

use by the Zoo that night. Class Connections is located on Reid Street just three doors south of McDonald. The building was formerly a Catholic School. Call 743-2228 for the address and any details you may require. There is parking in the back. Meeting time will be at 8:00 as usual.

Mark Coady presented his latest revision of the PAA light pollution abatement pamphlet - excellent work, Mark - and once again stirred the coffee mug availability issue. At $15 each with the club logo and personalized with your name, it's a deal so sweet you'll never have to add sugar. If you're not already on the gimme list, contact Mark at: mark.coady@sympatico.ca

We were all delighted to welcome Denis Gauthier as our newest member. Denis comes to us via the Class Connections Backyard Astronomy Class. When he's not stargazing, Denis plays Mandolin in a Blue Grass band. They'll be at the Montreal House this afternoon.

Stan Pope also came along for the observing session and to renew his membership for 2005. Welcome back Stan. We also were introduced to Catherine Kay's friend Karen who is considering becoming a PAA member. Make the right choice Karen – the magic word is YES!

The business portion of the meeting completed, we were off to Armour Hill for an observing session. Club members Rene Bowe, Mark Coady, John Crossen, Colin Cross, Catherine Kay, Rick Stankiewicz and Boyd Wood brought along their scopes while Rene added in his binoculars for good measure. Other stargazers included Shawna and Cheryl Miles, Susan Coady, Peter Schewchuck, Rob Fisher, Paul Brown, Jim Webster, Jaan Teng, Bret Hardy, John Cameron, George Bryant and the other PAAers already mentioned.

Prime targets for the night were Saturn, the Orion Nebula, and Comet Machholz. Colin had the comet in his 10-inch Dob and even as the haze drifted in, it was quite a sight in the big scope. Now shining at magnitude 4.9, Machholz is dimming slightly and binoculars were required to spot it. Those of us who have been following the comet since it was in Lepus have seen it rise to magnitude 4.1 at its brightest.

Catherine Kay brought her scope along and we all enjoyed the moment as Catherine had her first look at Saturn through the 'PAA Peashooter.' Catherine's friend Karen brought along her scope (another peashooter) and John Crossen took it home to do a little 'hot rodding' on its optical system.

As the night progressed, so did the haze, and about 10:30 the group broke up and headed home. All in all it was a good turnout and a just passable night under the stars. My thanks to Colin for his 'comet watch.' And to everyone else who attended – especially you scope toters. Once again, welcome to the PAA Denis. You're first in line for the second PAA loaner scope!

Feb 18 Meeting:

Our regular room at the Orientation Centre was unavailable, so we met at Class Connections is located on Reid Street.

Mark Coady was the night's guest speaker. His talk was on "astronomy and radio" and the connections between his two favorite hobbies. Before Mark got real serious about astronomy, he was a long time SWL (Shortwave Listener) and contributor to the Ontario DX association's newsletter, *Listening In*. He has found that there were many areas in both hobbies that overlap. The most obvious one is radio astronomy, however there were some less obvious areas that he noted in his presentation.

Mark Coady spoke to the membership on Feb 18, about how his two favorite hobbies; radio and astronomy are connected.

After his presentation, the membership viewed a short video from the IDA on light pollution.

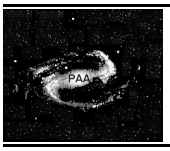
The meeting broke up around 9:30 and we all went our separate ways.

John Crossen & Charles Baetsen

Deep Impact – Coming Soon to a Comet Near You

While many stargazers are focused on Comet Machholz which is currently flying overhead, there's an even more exciting cometary encounter scheduled for July 4, 2005. It is called Deep Impact, and it will involve the first comet crash ever attempted.

The project, originated in 1999, is one of a series of low-cost, highly focused Discovery Missions that NASA has been planning for years. The objective is to



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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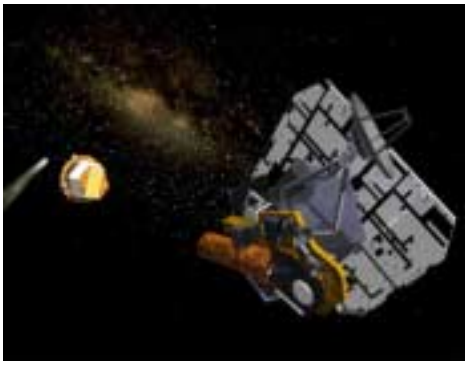

Artist's impression of the Deep Impact probe and impactor rendezvousing with Comet Tempel

learn more about the interior construction and the types of material at the interior of a comet. This is important, because comets are thought to be composed of the leftover materials from the formation of our solar system 4.5 billion years ago.

So why don't we just dig a little deeper into good old Terra Firma for our "Genesis Rock?" Because the Earth has undergone so much change since the time it was a molten ball until now, with its crusty mantle and tectonic plates shifting beneath, that none of the original rocks remain.

How to see a comet collision:

NASA already has amateur astronomers around the world monitoring Comet Tempel 1 for changes in brightness that might indicate out-gassing or other surface activities. If you'd like to join in you'll need a telescope of about 10-inch aperture and a visit to the Deep Impact web site:

http://deepimpact.umd.edu/stsp/objectives/index05.shtml

From there you can download observing data for both hemispheres as well as the time of impact

Of course we have examined some of the materials that out-gas from comets as they travel through our solar system. But that material isn't quite the same as what lies deeper within.

Smacking into the comet will release some of this deeper, ancient material into space where instruments for optical imaging and infrared spectral mapping aboard the Deep Impact spacecraft will examine it and the material in the crater it creates.

The comet we'll be playing tag with is Comet Tempel 1, a short period comet that orbits the Sun on a 5.5-year cycle. The rendezvous has been planned so that the Deep Impact spacecraft will release a smart probe when it draws near Comet Tempel 1. The battery-powered impactor will maneuver itself into the comet's path and on July 4th the two will meet – kerbang! Depending on the comets structure, the probe's impact may create a crater as large as a house or a even a football field – and deep enough to hold a 14-story building. It is not, however expected to have a major effect that would alter the comet's orbital path.

The main craft will remain about 500 km distant as the comet and probe collide. From this safe observation point it will take images and readings and transmit the data back to Earth where it will be broadcast over the Internet. Observing the event isn't limited to professional astronomers. Amateurs are already participating in the project by monitoring Comet Tempel 1 as it heads towards the impact point. As the 'big boink' draws near, I'll have more details on observing Deep Impact.

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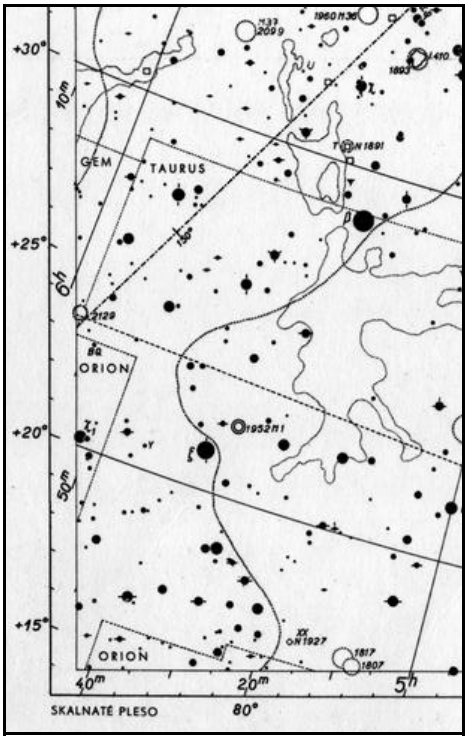
Astronomy in Philately

Charles Baetsen (your Editor) was hamming it up again on the radio waves. What does this have to do with stamps? Well, I guess he was able to listen to a radio broadcast out of Slovakia a few years ago now and the way that the ham radio and shortwave listening community acknowledges that you correctly heard their broadcast is through a QSL card. Charles got a QSL card from Slovakia (see attached image) in 2002 and on it were 3 stamps from a series on Slovakian lakes. Charles being the keen observer and astronomer that he is, immediately recognized the middle stamp as showing "Skalnate Pleso" or Lake Skalnate. This is the location of the oldest Slovakian observatory and also the home of the first major star atlas. Old timers in the hobby will immediately recognize "Skalnate Pleso" as the name of Dr. Antonin Becvar's most famous star atlas, Atlas Coeli Skalnate Pleso. This atlas was the standard atlas used by amateurs until Wil Tirion Star Atlas 2000.0 in 1981. By this time computers were an aid in the whole process and even though the atlas was to be expanded by a third, the major base mapping effort was done already.

The famous atlas gets its name from the Observatory at Skalnate Pleso, where it was put together in the late 1940's. There is a good write up on it at http://www.ta3.sk/becvar/atlasy.html,



The Skalnate Pleso Atlas Coeli (epoch 1950.0) was the standard observer's atlas until Wil Tirion's Sky Atlas 2000.0 replaced it in the early 1980's.

Radio Slovakia sent this QSL card in 2002 to acknowledge a reception report sent in by Charles Baetsen. The centre stamp is of the Slovakian lake "Skalnate Pleso", home of the Skalnate Pleso Observatory, where Antonin Bevcar's famous atlas was created..

including links to the observatory. It was truly a Herculean effort to originally compile this star atlas. Students who visited on their holidays at the observatory, over a two-year period, did most of the work. However, Dr. Becvar not only had the idea, but he had to check, label and do the final plotting of every object, that's about 35,000 different objects. Truly, an astronomical effort! Perhaps, the most significant appreciation to Dr. A. Becvar (1901-1962) for his atlases has been that a crater on the Moon was named by his name. It is certainly worthy of admiration, when you consider how unique a work, Atlas Coeli Skalnate Pleso truly is. It was the most used scientific aid of it's kind in astronomy for over three decades.

Talk about astronomical stamps in the craziest places. Thanks for finding this one Charles; thousands would have missed it.

Your Astronomical Philatelist
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BLACK HOLES Part 2

Red Giant to White Dwarf

In the 1800's scientists thought that atoms were hard and solid little balls that couldn't be pushed any closer together once they were touching. However, in 1911, Ernest Rutherford, a New Zealand scientist, showed that atoms were not hard and solid objects. The only hard part of an atom is the tiny nucleus.

To give you an example of how small an atom's nucleus is, it would probably take 100 000 nuclei placed side by side and touching to stretch across the with of one atom. The Nucleus also contains most of the mass of an atom. Around each nucleus is one or more electrons, which have hardly any mass, and they are arranged in layers around the nucleus making electron shells. When two atoms meet, the outermost electron shell of each atom act as bumpers that keep the atoms from getting any closer together. Earth gravitational pull, even at its core, isn't strong enough to smash the electron shells.

It's a different case with a star like our Sun, whose gravitational pull is much stronger than the Earth's. The atoms at the centre of the star have smashed electron shell, leaving the electrons to move about loosely. The nuclei can more about freely now that they don't have electrons surrounding them. The nuclei can even bump and stick together, which makes them go through changes that produce energy. So much energy is produced at the centre of a star that it can have a temperature of several million degrees! A star shines because some of the heat leaks out in all directions. The heat made in this way keeps the star expanded and doesn't let the atoms smash, except at the very centre. The energy at the centre of a star comes from the changeover (fusion) of hydrogen nuclei, which are the smallest there are, to helium nuclei which are the next smallest.

By the time most of the hydrogen in the star is used up, the centre has become so hot that the added heat causes the star to expand into a giant star. As the surface of the star cools, it turns red, making it a red giant.

When the hydrogen is almost gone, the thin outermost layers of the star expand away into a gas, creating a planetary nebula, which eventually disappears. The inner layers with most of the mass of the star now have not more energy to keep them hot. The star's gravity then pulls

The red star is a red giant in the open cluster M103. M103 is located in Cassiopeia.

these layers quickly inwards, making the star collapse. The force from the collapse and gravity is so hard that it smashes almost all of the electron shells. This makes the nuclei come much closer together than they would in ordinary stars.

Now the star has its mass squeezed into a small volume, making it very dense. It has become a white dwarf star. It will take our sun another 5 billion years to become a white dwarf.

So what stops the collapse and forms a white dwarf? Even after the electron shells of the atoms are smashed and the atoms have broken down, there are still the electrons. They take up more room than the nuclei do and keep the white dwarf from shrinking further.

In the next issue of the Reflector we'll tackle red shift, Chandrasekhar's Limit and the next steps on the way to a black hole – neutron stars and pulsars.

Shawna Miles
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The Sky This Month

MERCURY

Mercury is well placed for evening observing during the middle of March

VENUS

Venus is currently obscured by the glare of the sun.

MARS

Mars is visible in the morning sky.

JUPITER

Jupiter rises around just after twilight ends.

SATURN

Saturn is well placed for observing this month. It is located in the constellation Gemini.

URANUS

Uranus is located in Aquarius and is not visible this month

NEPTUNE

Neptune is located in Capricornus, but is hidden by the glare of the sun.

PLUTO

Pluto is not visible at this time.

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*.

Planet-X turns 75!

Planet X is one of those subjects that usually come up when kids visit the observatory. It sounds impressive, even a little menacing. But to tell the truth, Planet X is a name originated nearly a century ago by the talented – and wealthy – amateur astronomer, Percival Lowell. In the early 1900s Lowell and many other astronomers were studying perturbations in Neptune's orbit. They were convinced that 'something' else must be out there, tugging on Neptune.

Careful calculations were made and the area of the search was narrowed down. In 1905 Percival Lowell began the search. He had built the Lowell Observatory in Flagstaff, Arizona because tests had shown that the atmosphere was both clear and stable there. In short, it was an excellent site for an observatory devoted to the study of planets. This is where Lowell made his sensational, though erroneous, observations of the 'canals' on Mars. Lowell Observatory is also where Planet X lost its shroud of mystery. But it wasn't Lowell who made the discovery. He died in 1916. The task was later given to a young amateur named Clyde Tombaugh.

Tombaugh worked night after night using a machine called a Blink Comparator that compared two photographs of the same section of sky made about a week apart. If Tombaugh saw a spot that moved, he would check it with any known objects. And if it wasn't one of them, it must be Planet X. On a chilly February night in 1930 that's precisely what happened. And it was only 6 degrees from where Lowell had predicted!

Well, Planet X turned 75 last month. Its real name is Pluto – the Roman god of the underworld. It's an appropriate choice for a frozen rock that orbits the sun from the coldest, darkest location in our planetary system. Interesting, too, that PL from Percival Lowell's initials are the first letters in Pluto's name.

Tombaugh continued to scan the clear, crisp night sky, over Flagstaff, but ultimately he concluded that there was nothing else in that distant neighborhood orbiting our Sun that behaved anything like a planet. And with that, Planet X

Pluto was discovered using the 13" astrograph (a fast wide-angle telescope) housed in this building at Flagstaff's Lowell Observatory.

ceased to exist as a mystery of space, and took its place as our 9th planet.

Today, many astronomers are convinced that Pluto isn't a planet at all. They say that it is actually a Kuiper Belt Object (KBO) that has wandered in a bit closer than its more distant cousins. Indeed, Pluto's orbit doesn't follow any of the rules that apply to the other planets. Its orbital plane is more inclined than that of any of the other planets with the exception of Mercury. At times Pluto is actually inside the orbit of Neptune. Thus, from 1979 until 1999 Neptune was actually the most distant planet in our solar system. And if size has anything to do with being a planet, Pluto bends the rules to near snapping. It is actually smaller than our Moon.

So Pluto, a.k.a. Planet X, is still something of a mystery. Little is known of this distant object. It does have a moon, called Charon. But even Charon breaks the moon mould by orbiting Pluto nearly at a 118-degree tilt. That's nearly pole to pole as opposed to swinging around its equator.

Pluto's density is much less than that of a terrestrial planet. Yet it is higher than the mass of one of the gas giants such as Jupiter, Saturn, Uranus, and Neptune. So, what is it made of? Perhaps we'll go there soon. But at a distance that is about 40 times further from the Sun than Earth is, that will be a long, cold journey.

Meanwhile, let's go looking for planet Vulcan. Hey, I'm not kidding. It is thought that there may be a number of small planet-like objects (Vulcanoids) orbiting the Sun at a much closer distance than Mercury. So we may have bid farewell to our old Planet X, but these new Vulcanoids (sorry no relation to Mr. Spock) should keep the fires of youthful conjecture burning for a few more years.

Pluto at a Glance:

Mean distance from Sun: 5.9 billion km
Discovered: February 18, 1930.
Orbital period : 248 Earth years.
Moon: Charon (discovered in 1978)
Surface Temp: 50°K (or –231°C)
Atmosphere: gaseous methane
Surface: rock and frozen methane.
Magnitude: 13.7*

**Visible in 8-inch and larger telescopes only.*

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DISCOVERIES

Welcome to the inaugural column of Discoveries. We've decided that there are enough of you who don't have access to our yahoo group that the postings that I add about various astronomical discoveries should be reprinted here. Nonmembers who read the Reflector from our website will be kept up to date, as well. Most of the reports I quote from are direct from NASA and other agencies as I am on their e-mail list. If you find some news about an astronomical discovery - e-mail it along to me or snail me at 1038 Ward Street, Bridgenorth, ON K0L 1H0 or call me at 705-292-0458 but not too late on weeknights as I'm up just after 4 AM to commute to Scarborough.

Titan - An Earth that Never Happened?

Received direct from NASA:

From the more than three hundred pictures, as of January 15th, that have been transmitted back to the Earth from the Huygens probe, plus some environmental measurements that have been taken, NASA astronomers have found that Titan has some heavy fog and has drainage ditches, lakes, and islands. The ditches and lakes seem to be filled with liquid ethane or methane. The atmosphere appears to be comparable to that of the Earth's some 4.5 billion years ago.

Titan Is Wet

Received direct from NASA:

The Huygens probe landed in mud. Titan is indeed wet but not with water but with liquid methane. At a temperature of -290 F real water would have been long frozen but methane on Titan ranges from a liquid to a gooey gel.

Titan is also very humid. If not for the cloud cover, methane rainbows would be visible. They still might exist but in the infrared range where night vision goggles would be necessary to see them.

To quote Christian Huygens from 1698 about the possibility of watery planets "Since 'tis certain that Earth and Jupiter have their Water and Clouds, there is no reason why the other Planets should be without them. I can't say that they are exactly of the same nature with our Water; but that they should be liquid their use requires, as their beauty does that they be clear. This Water of ours, in Jupiter or Saturn, would be frozen up instantly by reason of the vast distance of the Sun. Every Planet therefore must have its own Waters of such a temper not liable to Frost."

More Evidence of Water on Mars

Via Reuters News Agency:
The European Space Agency's Mars Express has taken photos of an area known as Cerberus Fossae that may contain a major ocean of ice below a layer of dust and ash. It is believed that this ice formed over a large body of water, about the size of the North Sea, some 5 million years ago.

It is believed that the water came from beneath the surface of the red planet and gushed out after being heated by the inner core.

The findings, from photos taken last year, are to be published in the March 17th of Nature.

Blue Skies on Saturn?

Received direct from NASA.

Blue skies on Saturn? Most definitely. There is proof as Cassini has photographed them.

The air above the clouds in the northern hemisphere of Saturn has been photographed as being blue in colour. The southern hemisphere, however, continues to be yellow. It is thought that the yellow hue is from the clouds and that the clouds in the northern hemisphere must have sunk deeper in the atmosphere than the ones in the southern hemisphere.

If the rings weren't in the way, backyard astronomers might be able to pick out the blue hue - but, alas there is no hope for us as the rings will be in the way for at least another year.

Check out the poster of Saturn that came with the September/October 2004 issue of Skynews. The full planet view taken by Cassini shows a distinct blue hue around the north pole.

Mark Coadyv
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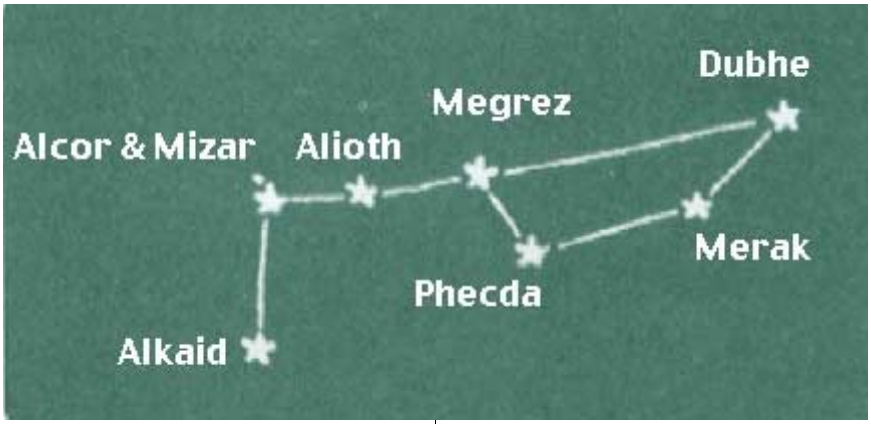
Moon Fact #6

The side of the moon we always see is called "the near side". The side we never see from Earth is called "the far side". Maybe that's where Gary Larsen got the name for his comic strip.

There is no sound on the moon. Nor is there weather, clouds, wind or colour at sunrise and sunset.

Stars don't Fall, but they sure do Move

Imagine looking up into the northern night sky and not seeing the familiar dipper shape. In about 100,000 years that's precisely what will happen, because the stars that comprise that familiar asterism will have moved. In fact we'll have to change the dipper's name to the Big Folding Camp Spoon, because that's what it will resemble.



Introducing the Big Folding Camp Spoon. This is how our Big Dipper will look in 100,000 years. By the way, the Big Dipper is only part of a constellation called the Big Bear or Ursa Major. The Dipper portion is properly called an asterism.

Alkaid, the first star in the dipper's handle, will have swung straight down so that during the summer when the dipper is level with the horizon, it is beneath Alcor and Mizar, the famous double star. And the stars that we see in the dipper's cup will have stretched that familiar cup-shape out into more spoon-like proportions. This means that the two stars in the dipper's cup that we now use to locate the North Star will have moved. But that won't matter because the North Star will also have shuffled away from its current location.

In fact, a star named Vega will replace Polaris as our new North Star in just 12,000 years, thanks a process called precession. Precession is the fancy name for a wobble in Earth's tilted axis that that alternately makes the stars Thuban, Polaris, and Vega our north-pointing star. It's a slow 25,800-year cycle, so you won't feel a thing.

Mind you, the dipper's demise will take time, too. In 25,000 years you'll hardly notice any difference in its shape. In 50,000 years it will definitely have morphed a bit. But in the year 102,005 calling it the Big Dipper will be so… so…well yesterday.

All of this stellar movement has me wondering what will the horoscope floggers do in the future? Virgo, Taurus, Scorpio, and Sagittarius – all of familiar constellations will have changed shape because the stars will have shifted. Connect their dots in 100,000 years and you'll come up with something very different – if they resemble anything at all. So much for the old, "what's your sign" pickup line at the Leapin' Lizard.

The point of all this is that our whole universe is moving. How fast? Well, it just expanded 100 trillion cubic light years in the time it took you read this sentence. The Andromeda Galaxy is rocketing towards us at the rate of 15 km per second. In another 8 billion years it will collide with the Milky Way. Even the Moon is moving away from us at the rate of a few centimeters each year.

Put it all together and it seems that change is the only constant we can count on.

John Crossen
JohnCstargazer@aol.com

Radio Astronomy On The Cheap

Ever thought of adding radio astronomy to your enjoyment of the hobby? No? Well, apparently it's not as difficult or expensive as you might have thought.. You're already doing it today. That very low level hiss you hear

between stations on the AM dial is largely cosmic radiation - left over from the Big Bang. Armed with a fairly sensitive shortwave receiver, headphones, a tape recorder , and a number of half-wave dipole or full wave loop antennas, the average hobbyist has all they need to start enjoying radio astronomy by tuning into the red giant, Jupiter.

Jupiter emits several types of radio signals, including thermal emissions from the planet's interior, decimeter synchrotron emissions from the immense radiation belts surrounding the planet, and sporadic, highly intense decametric radiation from the planet's ionosphere, which is most easily received in the range of 18 - 22 MHz (20 MHz being the start of the 15 meter ham band). It is this decametric radio emission that is the focus of Project Jove, a NASA outreach program designed to bring planetary radio astronomy into amateur hands. The Project Jove homepage contains a host of materials to get you and other astronomers started in radio astronomy - *http://radiojove.gsfc.nasa.gov/index.html*.

Jupiter's decametric radio waves consists of long bursts (L) and short bursts (S). According to Project Jove, Jovian Long Bursts last a few seconds and "sound like ocean waves breaking up on a beach". Short Bursts last only a fraction of a second, but typically come in groups so they sound "like popcorn popping - or like a handful of pebbles thrown onto a tin roof". Often both Long and Short Bursts occur together, making it quite difficult to sort them out; so Project Jove suggests recording and graphing the signals for later study, and tuning up and down the dial a few hundred kilohertz, to see if the signals are still there. Jovian radio emissions extend over several MHz, so if you tune a few hundred kilohertz up or down from your target frequency (say 20 MHZ) and the signals are gone, it's not Jupiter you're listening to but possibly some man-made interference.

Your receiver should be a fairly high quality shortwave receiver or ham transceiver. You need to have its automatic gain and level controls (usually marked AGC and ALC) turned off. Connect your tape recorder and use headphones for listening. Two half-wave dipole antennas are erected at a height of at least ten feet. They should each be twenty five feet long and spaced twelve and a half feet apart. Cut them in the middle so that you have four equidistant legs. Join a leg from each antenna and solder to the center conductor of some coax cable and take the other two legs and solder them to the shield or braid. Although common CATV RG58 or 59 will work in a pinch, RG6 or RG8 is best. The coax should terminate in a PL259 UHF plug (the most common type of antenna plug for shortwave and amateur use).

If your antennas are oriented north-south then Jupiter will be best heard when it is directly overhead. An east-west antenna orientation is best when Jupiter is at a 45 degree angle in the sky. Full wave loop antennas, mounted vertically with each side being about 16 feet, will yield best results when Jupiter is at or near the horizon. The RASC handbook will be able to tell you where Jupiter will be in the sky.

How will you know if you are really hearing Jupiter. If you have recorded the signals - compare them with the sound archives of the University of Hawaii or Project Jove itself.

http://jupiter.wcc.hawaii.edu/soundarchiv.htm
http://radiojove.gsfc.nasa.gov/dal/data_samples.htm

Remember that this type of astronomy is not dark sky specific. You can do it at any time of the day and in all kinds of weather. If you decide to pursue this further then you might want to contact the Society of Amateur Radio Astronomers - SARA (*http://www.qsl.net/SARA).*

Abridged from "Chasing Jupiter" by Julian A. Smith from the February issue of "Listening In", the monthly publication of the Ontario DX Association - used with permission

Your Guide to 10 Brightest Stars

7—Rigel

On the western heel of Orion the Hunter rests brilliant Rigel. In classical mythology, Rigel marks the spot where Scorpio the Scorpion stung Orion after a brief and fierce battle. Its Arabic name means the Foot.

Rigel is a multiple star system. The brighter component, Rigel A, is a blue super giant that shines a remarkable 40,000 times stronger than the sun! Although 775 light-years distant, its light shines bright in our evening skies, at magnitude 0.12.

Rigel resides in the most impressive of the winter constellations, mighty Orion. With the exception of the Big Dipper, it is the most recognized and easiest to identify constellation. It helps too that the shape made by Orion's stars match what the mythical figure represents. Three bright stars are lined up together to form the belt of the hunter. The other four stars surrounding the belt compose its shoulders and legs.

Telescope observers should be able to resolve Rigel's companion, a fairly bright 7th-magnitude star. However the jewel in Orion is the "Great Orion Nebula," a vast stellar nursery where new stars are still being born. It can be found six moon widths south of the belt stars.

A heavy star of 17 solar masses, Rigel is likely to go out with a bang someday, or it might become a rare oxygen-neon white dwarf

Rick Stankiewicz
stankiewiczr@nexicom.net

There's Never a Cloudy Night in Our New Planetarium

One of the biggest problems any astronomy club can encounter is getting group tours and clear nights to coincide. It can be a real heartbreaker for the kids – especially during cloudy months like November. Now there's an answer that not only works in cloudy weather, but anytime of day or night.

It's our StarLab portable planetarium dome. The dome is about twelve feet high and sixteen feet across. A high-output fan keeps the dome inflated while inside, up to twenty kids sit around a star projector that beams the constellations onto the inside of the dome. But the cool thing is that whoever is running the show becomes *Master of the Universe.* He or she can change the constellations to match different seasons or a particular time of night. The importance of the North Star as a navigational tool is quickly demonstrated with a spin of the projector canister. It's also easy to show some observing tricks like how the stars in Orion's belt can be used as pointers to other starry targets such as Taurus the bull and the Pleiades, as well as the bright star Sirius and the constellation Canes Major.

The planetarium is a joint project between Buckhorn Observatory and the Peterborough Astronomical Association. Perhaps you saw it in action last July 1st at the Buckhorn Community Centre. At the time we had borrowed the dome and projector from the Haliburton Forest Observatory. During the course of Canada Day we had about 150 people take the sky tour, and it was quite a hit.

Students can enjoy a realistic tour of the constellations and ask plenty of questions in the BHO/PAA Planetarium

Now it's ours to share with you. In fact the PAA dome has already made the rounds at Peterborough's Edminson Heights, Queen Elizabeth and Rhema Christian Schools. Accompanied by a separate slide show, the presentation gave the kids an exciting 'non-textbook' astronomy experience. And there was plenty of time for questions and answers.

Two people can be set up the planetarium in about a half an hour. And taking it down entails nothing more than turning the fan off and folding up the dome once it has deflated. A small gymnasium is a perfect setting for the dome. Once up and running it requires about an area about 25' x 20' to accommodate the entrance area and the fan port. The dome can be set up outdoors, but on a windy day it can be dicey. Plus we need a 120V electrical outlet to run the fan.

Sounds great, but how much does it cost? All the BHO and PAA ask for is a small donation to help cover the dome's initial cost and maintenance. Any excess will be split between the Buckhorn/Cavendish Libraries and the Peterborough Astronomical Association.

Think you'd like to become a Master of the Universe? We need a few more able bodies to tour with the planetarium. Contact John Crossen at 657-7718 and we'll schedule a setup session so that everyone can practice.

John Crossen
JohnCstargazer@aol.com

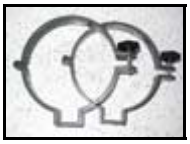
Classifieds

Rare D&G 5-Inch Apochromatic Refractor is just one of 10 produced by this venerable old company. Focal ratio is F9.5. High costs curtailed production in the early 1990's. Adjustable lens cell features ED glass. 2" focuser and diagonal included along with original wooden carry case. **$3,750** takes it home.

Wooden Tripod Features Equatorial Head and 5-inch Mounting Ring. This well-made setup was originally was home to a Schmidt/Newt. Features manual R.A. and DEC. controls. Needs a counterweight bar. If you have **$25**, I have your next mount.

EQ-5 Tripod and Mount features drive motors on both axis. Operates on 4 D-Cell batteries. Includes mounting bar and counter weights. Sturdy enough for an 8-inch Newt, SCT, or 4-inch F12 Refractor. Yours for just **$350.00**

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



Rings for 4.5" reflector. Pair of telescope rings that fit 4.5" reflector (Synta, Skywatcher, Celestron, Orion etc.) Asking **$25**.

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

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 27th, 2005

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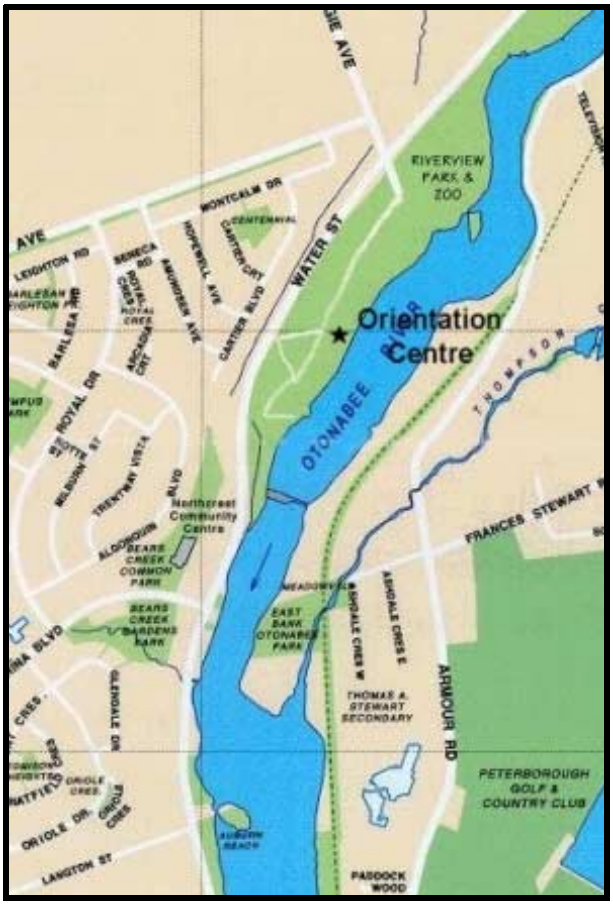
MEETINGS

The Peterborough Astronomical Association meets every second Friday at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **8:00 pm**.



CALENDAR OF EVENTS

March 4, 2005	**General Meeting—**Observing Night at Armour Hill
March 18, 2005	**General Meeting—**Richard Matthews – Satellites Part 2
April 1, 2005	**General Meeting—**General Meeting and General Mayhem
April 15, 2005	**General Meeting—**Astronomy Day preparations/Movie
April 29, 2005	**General Meeting—**Observing Night - Don McDonalds Observatory

MOON PHASES

Last Quarter (☾)	**March 3, 2005**	**April 1, 2005**
New Moon (●)	**March 10, 2005**	**April 8, 2005**
First Quarter (☽)	**March 17, 2005**	**April 16, 2005**
Full Moon (○)	**March 25, 2005**	**April 24, 2005**