

### Editorial

The month of February was named after the Roman goddess Juno (the patroness of the passion of love), under her title of Februa. The name, Juno Februa, came about because of the Roman ceremonies for religious purification or "februa" which took place during that month in anticipation of the old Roman new year (March 1). Valentine's Day is a modern day remnant of one of those festivals.



Juno as depicted on a Roman Coin

The month was not originally included in the Roman calendar. Around 700BC, Numa Pompilius added the month of January to the beginning of the year, and February to the end. This made the Roman year 355 days long. Before this, the calendar consisted of only 10 months resulting in a year of 304 days. The Romans seem to have ignored the remaining 61 days, which fell in the middle of winter (not that I blame them).

Speaking of winter, what a strange January we had! I think it must have been the warmest one on record. Unfortunately, it was most probably the cloudiest as well. With any luck,

February will give us many opportunities to view the heavens above. If it doesn't, you can always check out Sky and Telescope's new web site at [www.skyandtelescope.com](http://www.skyandtelescope.com). It is a big improvement over the old web site. Among the enhancements is a searchable index of all their magazines since 1941. Very Nice!!

Clear Skies

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### Strolling Through Our Solar System

*Always "biggie" your fries? You'll love Jupiter!!!*

Jupiter ranks as the Big Mac of our solar system's nine planets. Make Jupiter the size of a basketball, and Earth becomes a puny golf ball when placed beside it. Roll Jupiter's circumference out lengthwise and it stretches more than the 400,000 kilometers from Earth to our Moon. Want to match Jupiter's volume? You'll need our planet 1,400 times over to match it.

Jupiter's huge size translates into a total mass roughly 318 times greater than

that of Earth, giving it immense gravitational pull. As a result, your favourite quarter pounder would become a 79.5 pounder on Jupiter! A woman who weighs a dainty 68 kilograms on Earth



Jupiter—King of the Nine Planets

would tip the Jovian scales at a floor-buckling 21,186 kilos! But forget about Weight Watcher's, Jupiter's oppressive gravity will have already squished her flat as a Frisbee.

Jupiter's powerful gravity also acts as a tether that keeps its 28 moons in orbit. By the way, Jupiter's four largest moons are just visible in a pair of 10x50 binoculars. They are also known as the Galilean Moons after Galileo Galilei, who discovered them in 1609.

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Jupiter's gravitational lasso is also credited with pulling in the occasional comet. Perhaps you recall Comet Shoemaker Levy 9 from a few years back. The long arm of Jupiter's gravity first broke the comet into nine pieces, then yanked them beneath its clouded surface. Some say that Jupiter's "power of attraction" has helped protect Earth from rogue comets in the past.

When looking through a telescope you'll notice that Jupiter looks like a large striped ball that has been flattened a bit. That's because the massive planet spins well in excess of 35,000 km per hour. So despite the fact that Jupiter dwarfs Earth, it rotates over twice as fast. In fact a day on Jupiter lasts just 10 hours and 58 minutes. This not only makes for a very short day, but also generates considerable centrifugal force. No wonder the Jovian giant is a little out of shape.

When you look at Jupiter through a telescope you are viewing its top cloud layers. The light coloured belts are ammonia clouds and the darker belts are ammonium-hydrosulfide-crystal clouds. Were it possible to slice Jupiter in half you would discover a second layer of molecular hydrogen followed by another of liquid hydrogen and finally, a rocky core of iron silicate. So a visit to Jupiter would require a space ship to get there, an airplane to fly through the top clouds, a submarine to navigate the liquid levels and finally an ATV to scoot around on its iron core.

Jupiter is the fifth planet from the sun. It takes sunlight about 43 minutes to reach Jupiter. With an upper cloud level temperature of -145°C, about the only thing the huge planet can't attract are sun seekers.

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## Things that Flash in the Night Sky

The sun had set and the cooling earth was sending up warm air into the cold night air causing the sky full of stars



**SkyLab—The first US space station.**

to dance. Fall was upon us and I was bringing in another arm full of wood for the fireplace. Walking back to the house my attention was drawn to a moving light which, as it moved, changed in intensity to the brightest object in the sky, then continuing on, faded to a faint light. At first I thought it was an aircraft that had turned on its landing lights, approaching the near-by airport. It was becoming obvious that its track was not towards the airport but to the north-east and it was descending as the light was again growing in intensity. The silence of the night denied the confirmation that it was an aircraft.

When you cannot immediately identify an object, the mind suddenly runs through the most frightening possibilities. UFOs! No it couldn't be...but yet.... you continue to watch it as the hair on the back of your neck begins to tingle. When the light finally, and quite suddenly, disappears your mind is overrun with the most unmanageable scenarios, as you glance over your shoulder with the heart rendering fear that some-thing is watching you.

Some hours later watching the newscast on the TV the explanation was made clear. Sky Lab, first launched in 1973, was tumbling out of control and would burn up as it hit the

earth's atmosphere. That was in 1979.

Now all too often we see the thousands of satellites and the over eight-thousand pieces of space junk under 10 cm in size, trekking across the night skies. Many enthusiasts calculate and track satellites and orbital debris. It is astonishing at some of the things that are orbiting out there. For example, Vanguard I and II, launched in 1958 and 1959, are still orbiting the earth.

To view and track these orbits some knowledge of astronomy and the use of a telescope are helpful. When you are looking for something else to view may I suggest that you check out the following [www.satellite.eu.org/satintro.html](http://www.satellite.eu.org/satintro.html) and [www.orbitaldebris.jsc.nasa.gov/faq/faq.html](http://www.orbitaldebris.jsc.nasa.gov/faq/faq.html) for yet another aspect of viewing the night sky.

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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.

### Website

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## Tarp Domed Observatory

Like so many amateur astronomers, I always wanted my own observatory. For years, I had access to my in-laws farm outside of Millbrook. In time, however, the 20-minute drive (one-way) plus setup/rip down time, made me think twice before heading out to an observing session (especially during weeknights). For years I have been meaning to build a “roll-off” roof observatory. I really never considered having a dome because of the complexity and cost of its construction. Fortunately, I came across an old observatory for free. Thanks to Dave Duffus, I got a lead on someone who was getting rid of one.

The observatory, consisted of a hexagonal base with six 4'x4'x1/4" plywood walls, plus several odd bits and pieces along with a canvas dome. It was in rough shape, but still salvageable.



**Original State of Observatory**

In order to transport it back to the site, I had to disassemble the original base, so that it could fit in the back of a 1/2 ton truck. The six 4'x4' pieces of plywood were bolted to a steel frame made out of angle iron. It would have been easy to disassemble, had the bolts not been rusted tight. All the same, I managed to get it to the site. When I reassembled it, I

used stainless steel bolts, so that if I ever had to do this again, the job would be much easier.

observatory in the beginning of winter, which meant I was limited as to what I could do to it, at that time. So I plopped it down on a corner of the lawn and I



**Current state of Observatory after painting and putting in a floor**

### Reconstruction:

Once the base was re-assembled, I had to deal with the dome. The original one was made of canvas stretched over a structure made of 3/4" PVC pipe (see photo). The canvas had rotted in several places, but there was enough left to use as a pattern for a new one. It also served to provide clues on how to assemble the dozens of PVC pipes I received in a box. Sherlock Holmes would have been impressed!

To reconstruct the covering, I purchased several sheets of blue tarpaulin. I then traced out the patterns. This led to a new problem—sewing them together. Luckily, Will Juodvalkis came to the rescue. His mother had been a seamstress, and we managed to get her to sew it up for me. With that aspect over, I now had a usable, although Spartan, observatory.

Unfortunately, I took possession of the

waited. When spring came, I was able to finish it off.

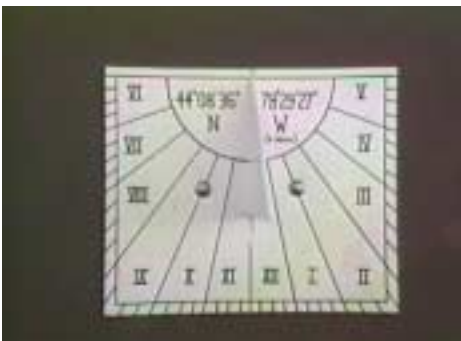
The first thing I did was put in a floor. This was needed because the ground was muddy for about a month after the snow melted, rendering the place useless. It consisted of a pressure treated wood base with a 1/2" plywood floor. Like the observatory itself, this is a temporary measure, until I can make a cement floor.

Like a used car, other problems cropped up. The door hinges were rusted out, and out there (on top of a hill) the wind is not very forgiving. I fabricated a new door and then gave the whole building a new paint job.

In the inside, I added a map holder, which also serves as an eyepiece holder among other things. I also added various shelves and things to keep stuff off the floor. As a final touch, I placed a sundial on the south facing wall.

Lessons Learned:**More Space:**

You can never have enough room. In most municipalities you are limited to 100 square feet before we need a building permit. The area of this observatory is only 41.5 square feet, so I have a lot of room for expansion. If I use my 8"-f/7.5 scope, there is little room for someone to pass between the scope and the wall. Another two feet on the periphery would help. Of course another solution is to go for an 8" SCT.



**The South Facing Sundial**

**Wind-shield:**

In retrospect, I am glad this is a dome as opposed to a "roll-off" roof type observatory. The wind can be quite severe here and of course the winters can be cold with temperatures a low as -25°C. The dome provides an excellent windshield and lets you observe on otherwise, uncomfortable nights.

Future Directions:**Wooden Dome:**

Eventually, I will have to replace the tarp dome, with something more permanent, like a wooden dome. Most people I talked too said that the tarpaulin will only last two summers, so I will have to do something soon. I am already starting to see this problem. Small cracks and rips are starting to show.

**Solar Power:**

Since I am a located away from the

house, I use a 12V gel-pack to any run lights, clock drives etc. The gel-pack seems to last about a month and half between recharges. It seems that every time I want to take some pictures, the battery is close to dead. A solar cell recharging system would save me the hassle of taking the battery home for recharging and missing those rare photographic nights. Recently I purchased two 80 mA solar cells from Canadian Tire. This should provide enough trickle charging between observing sessions to keep it fully charged.

**Warm-up room:**

One of the things that would be nice is to have a warm up room, where I can have a PC and a small library. The current plan is to remove the north wall and build a square room on that side.

Clear Skies

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## The Sky This Month

**MERCURY:**

Mercury will be visible for much of February in the morning. Look for a lone white "star" in the S- SE, 30 to 40 minutes before sunrise..

**VENUS:**

You may be able to catch Venus low in the west later this month as it returns as the "Evening Star". It will be close to the sun's glare so it might be a bit of a challenge.

**MARS:**

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

**JUPITER:**

Jupiter will be in Gemini and appears

far brighter than any star, including Sirius in the evening sky.

**SATURN:**

Saturn is in the constellation Taurus in the eastern evening sky. In a telescope, look for the large moon, Titan, which is near by. On February 20 the moon occults Saturn at 7:14 pm.

**URANUS & NEPTUNE:**

Uranus and Neptune are in the sun's glare this month, and thus are not visible .

**METEOR SHOWERS:**

There are no major showers this month, however there are three minor showers visible from the northern hemisphere:

<u>Aurigids:</u>	Feb. 5-10
<u>Delta Leonids:</u>	Feb. 22/23
<u>Sigma Leonids:</u>	Feb. 25/26

There are also two "daylight" meteor showers.

<u>Capricornids-Sagittariids:</u>	Jan. 30-Feb. 3
<u>Chi Capricornids:</u>	Feb. 13/14

These can only be detected by using radio techniques (unless you happen to get a nice fireball).

## "Parfocalizing" Your Eyepieces

*This article first appeared in the June 1994 issue of the Hamilton Amateur Astronomer's newsletter "Event Horizon". Reprinted, with the Author's permission.*

After a 30 year absence, I recently rediscovered amateur astronomy. I also made a giant technological leap from a homemade 6" Newtonian, including homemade tube and mount, to a brand-new computerized 8" SCT.

I had several eyepieces, none of which focused in the same place. I have also rediscovered a law of nature which states, "When switching eyepieces, you always start adjusting the focus in the wrong direction!" The process is frustrating and annoying.

During one evening's viewing session, the solution to the problem came to me. You may find it useful, too. Each eyepiece is harmlessly modified with a sleeve of plastic placed around its barrel.

The first step is to find out which eyepieces need modifying. The whole process should be carried out focusing on a distant, daytime, terrestrial object.

- a. Place the first eyepiece in the holder, seat it down as far as it will normally go and focus on your chosen object.
- b. Place the second eyepiece in the holder and without adjusting the focusing knob, slowly pull the eyepiece back checking to see if it will focus. If it can focus further out than the first one, simply set it aside for now. If it won't focus, leave it fully seated in the holder and refocus on your object.
- c. Repeat this procedure with eyepieces 3, 4, etc. You will eventually have one eyepiece left in the holder focusing closer to the primary optics of your scope than any of the others. It will not need any modifying.

The second step is to determine how much each of the other eyepieces has to be positioned out from the holder in order to be in focus.

- a. With your "closest focusing eyepiece" in place, focus and do not adjust again.
- b. Taking each of the other eyepieces in turn, slowly pull them back until you get a sharp focus. If you can now lock them in this position, the next operation will be easier.
- c. Measure the distance that the seat of the eyepiece is out from the holder.

If you have several to do, a little chart at the scope will help to keep the numbers straight.



**Measuring the focal offset with a Vernier Caliper**

You now have to make a spacer for each eyepiece, to hold it out the measured distance from the holder. I found that the protective caps that cover the barrel end were perfect. A squarely sawed-off dowel or broomstick held in a vice helped in both the marking and cutting of the spacers.



**Scribing the ring with a compass**

A compass for drawing circles is used for marking a line at the correct distance all around the edge of the cap. Hold the cap over the end of the dowel, secure the compass in the wood at the correct distance and carefully rotate the cap until it is marked all around its perimeter.

Use the same dowel to support the cap as you cut the spacer off with a sharp tile knife. Slip the spacer over the barrel of the eyepiece. If it is not snug enough, a small piece of margarine tub plastic slipped underneath should hold it tight.



**The Finished Product**

A word of caution. Make sure that each modified eyepiece has enough of the original barrel left exposed to secure it safely in the holder without falling out. Spend a short time making these spacers for your eyepieces and enjoy more time viewing, less time focusing.

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## Music Review:

**The Planets**, by Gustav T. Holst, CD by DECCA Records, part of the Eloquence Series. Total time 67:41 minutes. (Chapters Bookstores, \$7.99 CDN)

If you have an appreciation for classical music and astronomy, then you will enjoy this CD of composer Gustav Theodore Holst's music called "The Planets" performed by the Los Angeles Philharmonic Orchestra. Holst was a British composer who lived from 1874 to 1934. He completed his best-known work, *The Planets*, in 1916. Like many of his earlier works, this orchestral arrangement was influenced by his fascination of English folk songs, astrology and Hindu mysticism. This comes out in every track of this heavenly music. It takes little effort to visualize each planet as the tracks play through from Mercury to Neptune (remember

Pluto was not discovered until 1930). Holst did not provide a program with this work, aside from how he suggested in the way he titled each movement:

- ◆ **Mercury**, the Winged Messenger;
- ◆ **Venus**, the Bringer of Peace;
- ◆ **Mars**, the Bringer of War;
- ◆ **Jupiter**, the Bringer of Jollity;
- ◆ **Saturn**, the Bringer of Old Age;
- ◆ **Uranus**, the Magician;
- ◆ **Neptune**, the Mystic

This CD is a wonderfully diverse composition that could add a whole new dimension to your interest in astronomy. It has for this listener and at \$7.99 for over 67 minutes of quality music; this is certainly one of the best purchases I have made in a long while. As an added bonus, included on this CD are tracks from both Close Encounters of the Third Kind (Suite) and Star Wars. If they had included the theme from 2001 – A Space Odyssey, it would be a perfect CD.

You will not be disappointed, but hurry while supplies last.

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## Starry Memories

The other night while shuffling through a stack of slide trays for a presentation I was preparing, I came across a dusty Kodak Carousel box labeled "Star Hill Inn." For those of you new to amateur astronomy, Star Hill Inn was the original "Astronomers Retreat." Located in a remote section of New Mexico at 7,200-ft. altitude, the night sky is fantastic. Those with sharp eyes can pick out stars down to 6.5 magnitude. It doesn't get much better than that.

Deb and I made the trek to Star Hill almost a decade ago. The daytime scenery enchanted us with vistas of mountains overlooking rolling pastures, a buffalo herd and ranch houses. Some were still occupied and bustling with activity. Others were wind-worn, sun-bleached and bent from years of

abandonment. But the night sky - well, we'd never seen anything like it. Absolutely stunning would not be an understatement.



**This C-11 was the first piece of quality equipment either of us had used. Obviously it has been well cared for. We also have it to thank for an award-winning North American Nebula piggy back shot. After all, we just aimed the camera. The scope did the real work**

Prior to our arrival we had selected our "rent-a-scope." It was one of the great old orange Celestron 11-inchers. Deb had also reserved a Takahashi "Sky

Patrol" tracker for some wide field astrophotography. Other choices included a computerized C-14, one of the then-new Meade 7-inch refractors, a 17-inch truss-tube Dob and a 4-inch TV APO. Eyepieces were also supplied.

Our log cabin - there was seven as I recall - was spacious enough for two with cooking facilities, a dining area, living room, full bath and a separate bedroom. It was also authentically decorated with Native Indian décor and included a unique ceramic fireplace. I say unique as it belched much smoke and little heat. Perhaps the reason was that we'd forgotten our scouting days and how to prepare a fire.

We never had breakfast, as the weather gave us five long, clear nights. Mid-afternoon became morning and the evening brought yet another nap in preparation for the impending all-nighter. "Scoped out" took on a whole new meaning.

This was the first time we had really been able to ply our skills in astrophotography. It was early April, so I did all my photographs of Orion and the Orion nebula just after dusk. The star clusters M41, M46 and M47 were still well up in early evening and through the



**Star Hill's large deck features permanent piers for many telescopes. Also seen here is a gear storage room. In the background is the dome for the 24-incher.**

scope their starry spray was a striking sight against the black background. But the real treats came in the early morning

And I'm certain they are all a pleasure to visit. After all, astronomy people are just naturally good hosts. But just for



**Summer Milky Way in Sagittarius. This was the most spectacular sight we had ever seen. The dark sky provided us with stars that shown through the distant pines like Christmas lights. Gee Toto, this sure ain't Toronto!**

as Scorpius and Sagittarius rose in the east. We watched awe-struck as the Milky Way glided silently overhead like a beautiful white jump rope.

The cameras clicked on, night after night. And each following afternoon the one-hour photo shop in the nearby village would print out the night's work. Our rewards were many. With the exception of a few airplane passes, most of our photographs came out beautifully. Our C-11 had obviously been carefully polar aligned as it tracked beautifully with little or no guiding required. One of the prints we took of the North American Nebula won second place in the Novice Category at Starfest in 1993. The certificate with Terry Dickinson's and Jack Newton's signatures is still a prized possession. And I still use many of the photographs in my slide presentations. Our Star Hill venture was obviously time well spent and film well exposed.

Today, Star Hill Inn has many imitators.

old time's sake I visited Star Hill's web site. Sure enough, there's our old room. But some things have changed. The telescope selection now includes a 22-inch Dobsonian and a massive 24" Ritchey-Chretien Cassegrain. To my delight, the C-11 is still up and running. The photograph of the sign by the entranceway is now graced with Hale-Bopp hovering above it. And there are many activities during the daytime that weren't available when we made our pilgrimage to the home of the night sky.

Something else we discovered at Star Hill Inn was its wonderful peace and serenity. For a couple of city-bound space cadets it was Tranquility Base on Earth. Perhaps our experience there provided some hidden motivation to abandon Toronto and move north to the "land of shining waters." Certainly the joy we found beneath the Star Hill's pristine skies is one of the reasons we are so happy to share Buckhorn's night

sky with visitors to our observatory. If you'd like to check out Star Hill Inn, you can visit them at: [www.starhillinn.com](http://www.starhillinn.com).

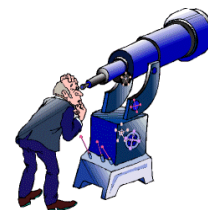
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## Archaic Star Name of the Month

My name in Greek meant *sparkling* or *scorching*. Homer, in the *Iliad*, referred to me as the "Star of Autumn", although today "Star of Winter" would be more apt. To the Romans, I was known as *Canicula*. To the Egyptians I was known as *Sihor* the "Nile Star" for I foretold the inundation of the great river. What star am I?

Last Month's Answer:  
*Polaris (α-UMi)*

WANTED  
Dead or Alive  
An  
Astronomer



...to introduce the wonders of the night sky to my Grade 6 class in Cobourg .

I am looking for someone to give a one hour presentation on the planets and constellations sometime this month. We are currently studying space and my students are keen to know more.

If you can help, please contact Patricia Baetsen at 705-876-0986 (after 6 pm) or email me at [va3ngc@rac.ca](mailto:va3ngc@rac.ca).

## Off the Beaten Path

This month brings an opportunity to view various deep sky objects in the winter Milky Way. One of the richest areas to view is the Monoceros region (east of Orion). The following are easily located objects in this region and others, visible this month.

NGC 2236/8/9: Known as the "Rosette Nebula", this wreath shaped cloud of gas surrounds the open cluster NGC 2244 in Monoceros. This is a difficult object to view unless you have dark skies, and a good nebula filter. Photographically it shows up well on any photograph of the area.



NGC2236/8/9—The Rosetta Nebula

NGC 1554/15: Located in Taurus around the famous variable star T-Tauri, "Hind's Variable Nebula" varies in brightness.

NGC 3132: Sometimes known as the Eight-Burst Nebula or the Southern Ring Nebula. This is the challenge object for the month. This 8th magnitude planetary reaches no more than 4.5 degrees above the southern horizon at this latitude. Located roughly a degree north west of q-Velorum on the Antlia/Vela border, this planetary is one of the brightest in the sky.

NGC 2244: This open cluster appears as a fuzzy star to the unaided eye. It is located slightly offset to the south west,

about half way between 13 and Epsilon-Monocerotis

NGC 2261: This comet shaped, bright patch of nebulosity near S-Monocerotis, is part of a much larger, visually invisible nebula. It is known as "Hubble's Variable Nebula" because the star that powers it (R-Mon) is a variable star, thus the nebulosity varies in brightness as well.



NGC 2261—Hubble's Variable Nebula

NGC 2264: Called the "Christmas Tree Cluster" because of its distinctive shape, this 3.8th magnitude object is located around S-Monocerotis. It is quite a pretty sight.



NGC 2264—The Cone Nebula

NGC 2264: Located on the tip of the Christmas Tree Cluster (and shares it's designation), the "Cone Nebula" is a patch of dark nebulosity that is in the shape of a cone. To view this you need

a dark sky and a good nebula filter.

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## Astronomy in Philately

This is the first in what is planned to be a series of articles that explore the use of astronomical subjects (anything space related) in the hobby of stamp collecting. This article is exploring First Day Covers (FDC). This is the format that postal services around the world use to introduce new stamps.

All modern FDCs will normally have the stamp being issued in the upper right corner of a special envelope, with a specially designed "cachet" on the left side. The cachet design will always compliment the theme of the stamp being released. Lastly, a FDC will always have a cancellation showing the date that the stamp in question was first officially released for sale. To illustrate the above, note the example on the next page of the FDC released by the British Philatelic Bureau on June 26, 1984.

In this case four stamps show the physical placement of the prime meridian. The 16p (pence) stamp shows a view from space. The 20 ½p shows a map of England where Greenwich is located. The 28p shows the astronomical complex at Greenwich. The 31p stamp shows a sketch of the Airy Transit Telescope.

The cachet on the left shows a picture of Sir George Biddell Airy (1801-1892), who devised the concept of a prime meridian. Note the line going through his eyes, which completes the design concept of showing where the meridian runs, depending on your view, right down to the one who looked through the telescope to establish the meridian.

Lastly, is the cancellation on the stamps. Note how this shows the FDC illustrated



**FDC Commemorating the Prime Meridian— released by the British Philatelic Bureau on June 26, 1984**

was cancelled in Edinburgh on June 26, 1984. The actual longitude west of Greenwich for Edinburgh is part the cancellation design ( $3^{\circ} 11' 57''$ ).

The Royal Observatory, Greenwich, was for three centuries the international centre of research in navigation and timekeeping. It was here in 1850 that the Astronomer Royal, G.B. Airy, designed and had installed a new transit telescope, whose site defined the Greenwich meridian, zero longitude. Other countries, however, used different systems of longitude. In 1884 an international conference met to decide on a single system to be adopted worldwide, and the Greenwich meridian was chosen as the world's prime meridian.

The Airy transit was in regular use for over 100 years; it is still in working order. Visitors to Greenwich can see the telescope, and stand astride the brass line marking zero longitude. Transit observations are now made at the new home of the Observatory at Herstmonceux Castle in Sussex (*which is owned by Queens University—Ed.*) and at La Palma in the Canary Islands: these, however, are adjusted to take into account the difference of longitude from Greenwich.

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## Time Travel

February is a busy month in astronomical history. Here's what happened on these dates during Valentine's month:

- ◆ **Feb. 3, 1971** - Apollo 14 lands on the Moon.
- ◆ **Feb. 4, 1906** - Clyde Tombaugh (Pluto's discoverer) was born.
- ◆ **Feb. 5, 1971** - Alan Shepard hits golf balls on the moon.
- ◆ **Feb. 7, 1999** - Stardust comet probe launched.



**During the week of February 11, 1997 the Hubble Space Telescope received a tune-up, some repairs and equipment upgrades.**

- ◆ **Feb. 8, 1828** - Jules Verne was born.
- ◆ **Feb. 9, 1971** - Apollo 14 returns to Earth.
- ◆ **Feb. 10, 1956** - Debbi Crossen was born. (Who?)
- ◆ **Feb. 11, 1984** - First shuttle landing at Kennedy Space Center.
- ◆ **Feb. 14, 1898** - Fritz Zwicky was born. (Theorized Gravitational Lensing)
- ◆ **Feb. 15, 1564** - Galileo Galilei was born.
- ◆ **Feb. 16, 1948** - Gerard Kuiper discovers Miranda, Uranus' moon.
- ◆ **Feb. 18, 1930** - Clyde Tombaugh discovers Pluto.
- ◆ **Feb. 20, 1962** - John Glenn becomes first American to orbit Earth.
- ◆ **Feb. 23, 1987** - Canadian Ian Shelton discovers supernova 1987a.
- ◆ **Feb. 24, 1969** - Mariner 6 was launched
- ◆ **Feb. 24, 1968** - Discovery of the first pulsar was announced.
- ◆ **Feb. 28, 1959** - Discoverer 1 was launched.

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## Book Review UPDATE:

In the December issue of the Reflector I did a review of the book by David Levy, *Comets: Creators and Destroyers*. This book normally retails for about \$17.00 CDN. I have recently seen copies of this book at a local used bookseller for \$9.00 to \$10.00. They were both in great condition and may still be available at the Quality Used Books store on Water Street, Peterborough. Only available while supplies last, so if you are interested, don't delay in checking this out.

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## How To Have Warm Buns at a Cold Eyepiece... Part 1

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Winter is one of my favourite seasons. No, I'm not deranged, but, I've learned to harmonize rather than fight with the weather it brings. I've spent many a weekend winter camping and enjoyed it thoroughly, day and night, even in temperatures of -35°C.

The learning came at the cost of numbness, shivers, and generally living my mistakes in the early boldness of these ventures. Last winter I was able to confirm that the same techniques that warmed me on trail and in camp would keep me cozy at the eyepiece of my telescope.

Here, then, is some of what I now know about dressing for comfort as applied to winter observing.

### How warmly should I dress?

Observing consists mostly of sitting or standing around as opposed to walking, chopping wood etc. Add to this the effects of radiating our heat into the inky night sky and you have a recipe for disappointment. The cure is simple. We need, only, to dress somewhat warmer than if we were outside doing some physical activity.

In order to be comfortable we need to *dress for a temperature of about 10 degrees lower than the air temperature.* This, by the way, is good advice for observing at any time of year, but, particularly so in winter.

### Know Thine Enemy!

Rather than provide you with a list of solutions, I would like to explain some of the processes at work as we try to keep

warm and the basic remedies for these. Once you understand what's happening, you become able to recognize symptoms and devise your own solutions to problems that may arise while you're outside on a winter's night.

The major culprit in making us feel cold is our *perspiration*. We're all familiar with the perspiration of summer, but, what about other times? It may surprise you to know that we perspire continually, all year round, all day long. It seems our skin is very partial to life in a tropical rainforest and tries to create these humid conditions wherever it may be. In fact our comfort demands these conditions. Skin *LOVES* moist air and sets about making this environment by perspiring into the adjacent atmosphere. This emerges from our pores as water vapour. We are generally unaware of this process and only feel a change when this forms on the skin as a film of water and then evaporates directly from the skin's surface. In this case, the perspiration is being used to cool us down rather than just avoiding dryness.

The process of evaporation, you may recall from high school physics, requires an additional bolt of heat (Latent Heat of Evaporation?) to go from a liquid to its gaseous state. It gets that heat from the skin's surface, thus, cooling us down in the bargain. But, we don't *WANT* to cool down on cold winter nights! So we put some clothing next to our skin and feel warmer. OK?... Maybe...

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### *The secret to Winter Observing is to dress in layers.*

1. *Undergarment Layer*
  2. *Insulation Layer*
  3. *Outer Shell*
- 

It depends on what that undergarment is made of. The most popular fabric for underclothes is cotton. We like its soft feel, it's inexpensive, and it's durable. Problem is, it's just about the worst thing one could wear next to the skin

on a cold night! You see cotton likes water. That is to say, cotton absorbs and retains water, which is why we use it in the best towels. One reason it feels so nice, is that it's much easier to have a rain forest next to your skin when what you're wearing is sopping wet! So, getting back to our skin, cotton soaks up the water and holds it by the jug full. Then, in order to stay warm, we not only have to keep ourselves warm, but, also that wet garment must be kept warm too! What we need is a fabric which abhors and detests water and would rather dump it out than retain it. *Polypropylene* is the best known of these "*anhydrous*" fabrics. It's a bit more expensive than cotton and you've got to be careful to wash it in cold water and hang to dry. Otherwise you'll be lucky if it'll fit the cat after a good hot wash & dry. We refer to such fabrics as having the ability to "*wick*" the water away. And that is just what happens. The perspiration is conducted away from the skin, often before it can even condense. Condensation, if it occurs at all, takes place on the outside surface of the garment all undetected by our lily whites and we feel warm. Kewel!!

### The Layered Look...

#### **Layer 1: Winter Lingerie**

We have seen how important it is to choose the right kind of undergarment fabric for staying warm in winter. The undergarment is part of a system of "*layers*" designed to maximize our heat retention and stay cozy while at the eyepiece or some other activity. This garment ought to be snug fitting. Let's refer to this as Layer 1.

#### **Layer 2: The Fluffies**

Next, comes the insulation layer. This, as the name states, is to insulate us from the cold of night. Garments are better to be loose fitting than tight. Appropriate fabrics are characteristically bulky, lightweight, and able to trap still air in its tangled fibers or "tiny air pockets"; air movement being a "no-no" for heat retention. Roughly speaking, they can be divided into 2 piles... *natural* and

*synthetic*. Each of these have pros and cons.

The most popular natural ones are down and wool. Down is “*nature’s own snuggly blanket*” and the most efficient insulator for our purposes. High grade goose down is able to provide more insulation value per unit weight *AND* per unit volume than any other material for this application. It has, however, one serious drawback. If it ever gets damp or wet (God forbid!) you’ve got *BIG TROUBLE!* It takes days to dry out and it’s insulating value plummets to uselessness in this state. Down is definitely *NOT* anhydrous. Remember the perspiration that passes through Layer 1? If it collects in Layer 2 (and it will!) you’re in for discomfort. Down is beautiful stuff and a great temptation, but, I’ve come to avoid it in clothing for this very reason. Well... that, and the fact that they want my firstborn for it!

Wool, on the other hand, is relatively affordable, and, while not having as high an insulation value as down, it does a pretty good job in clothing. Hey! One can always get *two* sweaters on... Right? More about this later...

What about dampness? Wool has the wonderful quality of retaining much of its insulation value even when its wet! It is much more forgiving than down. Think of it as having built-in insurance. I like it. My skin doesn’t!! Many, like me, have skin that rebels against dressing up like sheep. We either put up with the itching, tickling, and general torture, or, find something else...

Enter the synthetics. There are now quite a lot of great synthetic fabrics with excellent insulation qualities on the market. Names like *Hollofil*, *Quallofil*, and *Thinsulate* come to mind. They’re all anhydrous and a good choice for Layer 2. My favourite, though, is *Polartec* by Malden Mills. This stuff is very lightweight, has a luxurious fluffy feel to it, doesn’t “*pill*” (form little balls of fabric on the surface after repeated use; aka ‘*nubblies*’), and comes in an endless array of colours and patterns. It is so anhydrous, that if you, get it

completely soaked, just squeeze out the water, and it’ll hang dry in 20 minutes. It will even dry while you’re wearing it! I had the privilege of confirming this empirically on a Fall canoe trip once. But that’s another story...

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### *10 degree rule of thumb*

*Layer 2 is actually as many thin layers of insulation as you will need for the coldest temperature of the night in question minus 10°C.*

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OK! There you have it. Some Layer 2 facts and personal biases. The last thing to remember about Layer 2 is that it is far better to wear multiple thin layers than a single thick one. The wisdom in this is as follows... If you are warm to the point that you are feeling perspiration, then, you can (must?) peel a layer or two until your brain turns off the water tap. If not, you continue to push moisture through Layer 2 at a high rate. Even the best will have trouble keeping up with this and leave you with a jacket full of water to keep warm. So... Layer 2 is actually as many thin layers of insulation as you will need for the coldest temperature of the night in question minus 10°C. Remember the additional -10 degree rule of thumb?

### **Layer 3: The Wrapper**

Layer 3 is an outer shell with 2 important functions. It has to keep the wind and rain from getting to you, and, it has to pass the moisture that’s been traveling out through Layers 1 & 2 from your skin. Now, we don’t do much observing in the rain, so that’s not a concern here, but, keep it in mind for other outings when buying.

*Wind?* We don’t observe in the *wind!* Even the slightest of breezes will meander through Layers 1 & 2 and kiss you with frozen lips. We need to keep that air movement, however small, outside Layer 3! At the same time,

Layer 3 must allow our inner moisture free access to the universe. These two requirements may seem to be mutually exclusive in a single garment. Not any more!

There are a number of high-tech synthetic fabrics now that can do just this. The best known of these is undoubtedly *Gore-Tex*. *Gore-Tex* is as waterproof as a rubber glove, yet will allow water vapour or air to pass through the “*micropores*” in its waterproof barrier. If absolute waterproofing is not a biggie for you, then, consider a fabric known as *Super Microft*. It is what the manufacturer calls “*water repellent*”. My experience with this has been that it’ll keep you dry long enough to get to shelter... if you run! I like it because it’s an excellent wind barrier, lightweight, soft and comfortable, and, above all, it’s a good “*breather*” that’ll vent my own moisture to the world outside. Get them a size bigger than you normally would and they’ll be perfect at the eyepiece or any other cold outing. These specialty fabrics, and consequently, the garments, are a bit pricey. But, consider the following...

I have two shells: one in *Gore-Tex*, the other is *Super Microft*. My last *Gore-Tex* jacket is 10 years old and still going strong. (I grew out of it!) I don’t own or need a raincoat, overcoat, leather coat, parka, snowmobile suit, Fall or Spring jacket, K-way shell, or umbrella. I’ve avoided a lot of purchases over the years... Hmm? These two are functionally superior and look good too. Well... at least to those who know the magic they hold!

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*Next Month...*

*In part 2 we’ll look at keeping your hands, feet, and head cozy and comfortable along with a few goodies for a beautiful winter night’s observing...*

## ARTICLES

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

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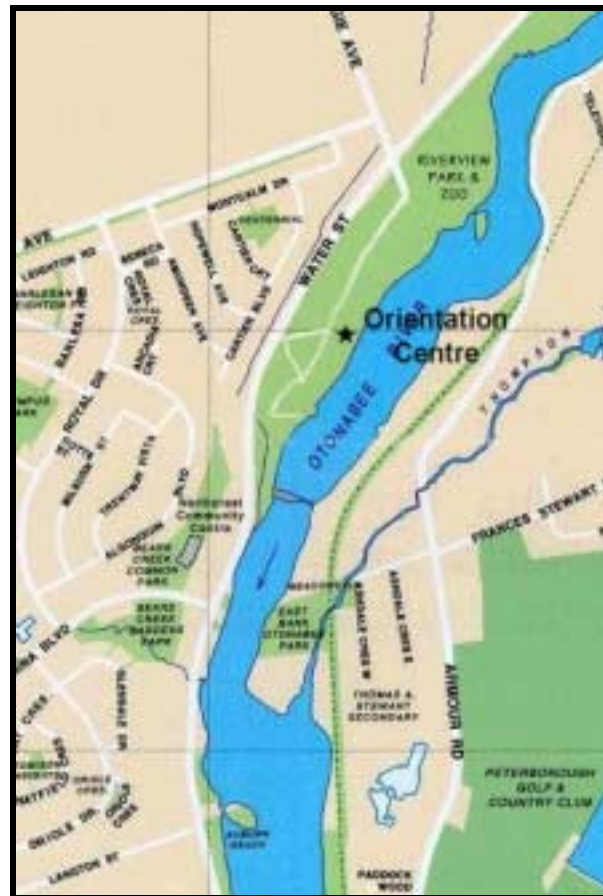
or via e-mail at:  
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**NEXT MONTH’S  
DEADLINE IS  
March 4th, 2002**



## MEETINGS

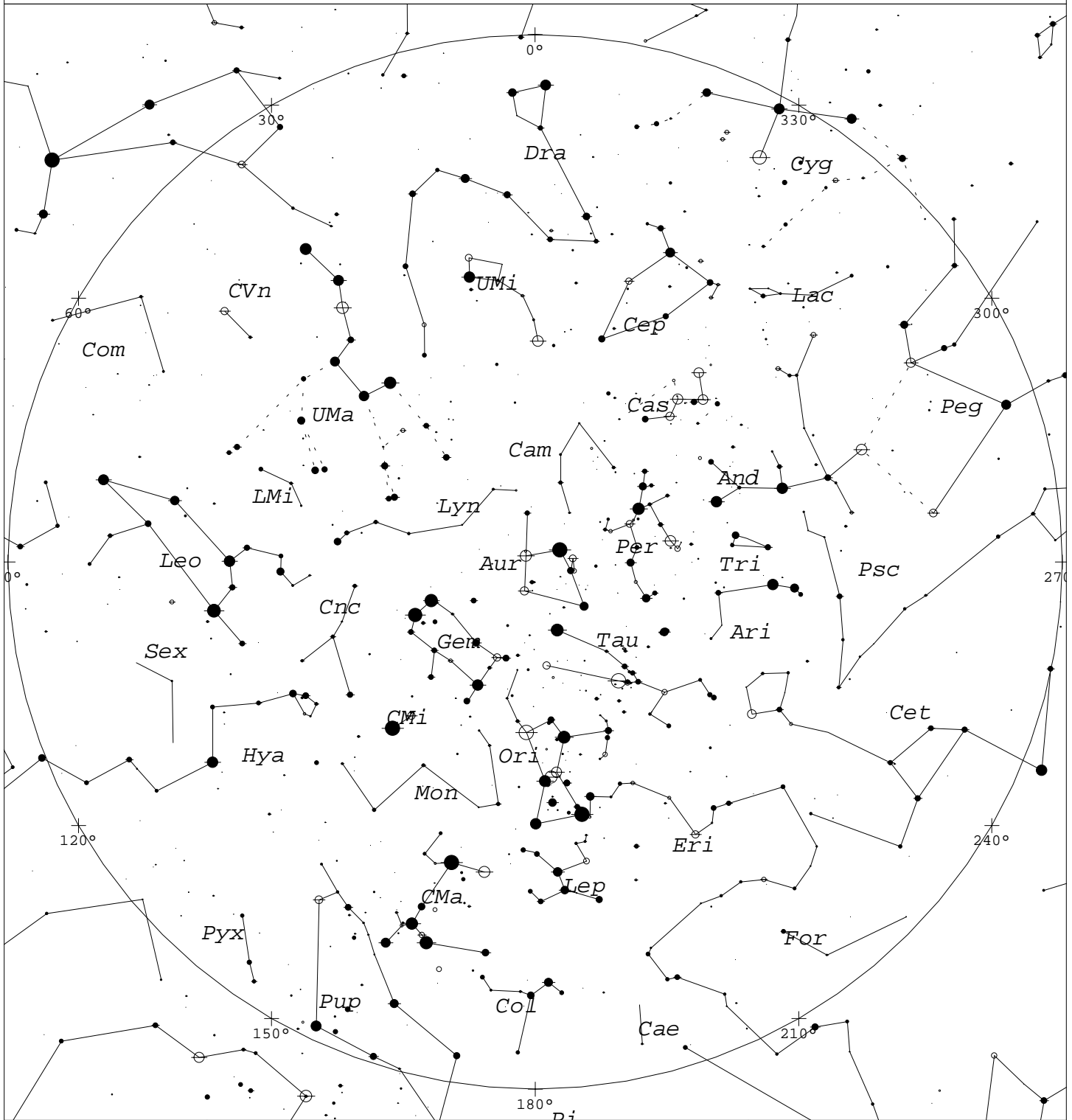
The Peterborough Astronomical Association meets every second Friday at the Peterborough **Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at **7:30 pm**.



## CALENDAR OF EVENTS

February 4, 2002	Last Quarter (☾)
February 8, 2002, 7:30 pm	<b>General Meeting</b> — Tony Wallace on “A Winter Camper’s Secrets for Cold Weather Observing”.
February 12, 2002	New Moon (●)
February 20, 2002	First Quarter (☽) - Saturn Occulted by Moon (7:00 pm)
February 22, 2002, 7:30 pm	<b>General Meeting</b> — TBA
February 27, 2002	Full Moon (☉)
March 8, 2002, 7:30 pm	<b>General Meeting</b> — TBA

# February Skies



## STARS

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

## SYMBOLS

- |                 |                    |                |
|-----------------|--------------------|----------------|
| ● Multiple star | ⊠ Dark nebula      | △ Radio source |
| ○ Variable star | ⊕ Globular cluster | × X-ray source |
| ☄ Comet         | ⊙ Open cluster     | ○ Other object |
| ☉ Galaxy        | ⊖ Planetary nebula |                |
| □ Bright nebula | ⊞ Quasar           |                |

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

UTC: 02:00:00 2-Feb-2002  
 RA: 5h48m23s Dec: +43° 38' Field: 182.0°

Sidereal Time: 05:48:22  
 Julian Day: 2452307.5833