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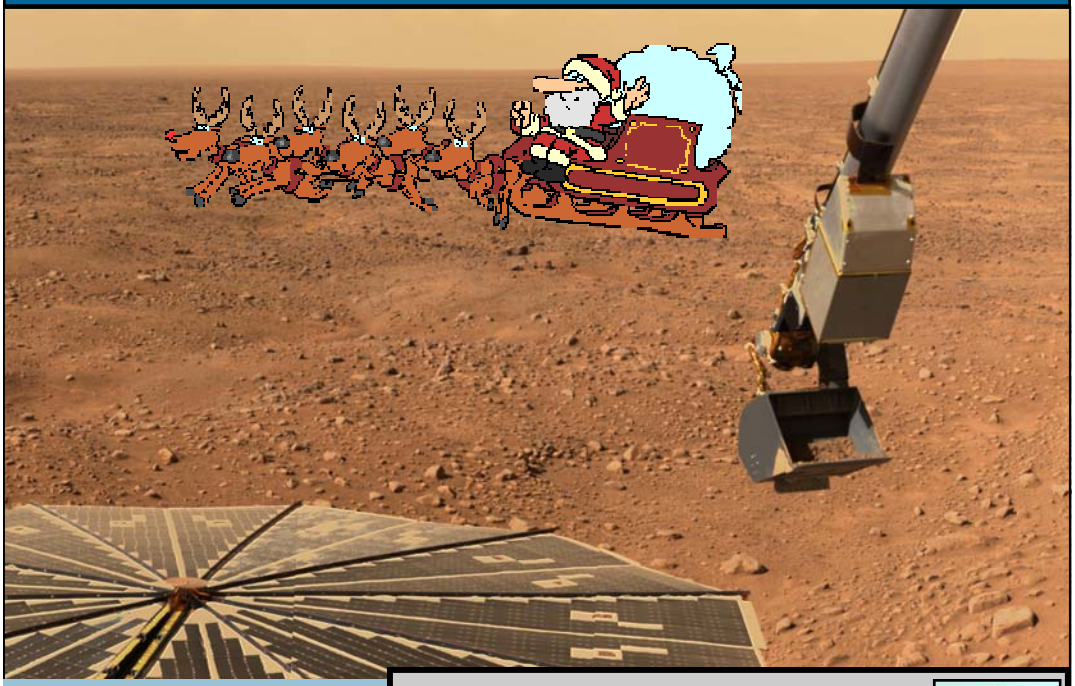
December 2008

HAMILTON AMATEUR ASTRONOMERS

Event Horizon

Mars Polar Explorer Finds Life on Mars!



NASA officials expressed surprise when the latest pictures from the Mars Polar Explorer found evidence of life on the Red Planet.

"We were reviewing the latest data to come back and found a picture of a jolly old elf and 8 tiny reindeer pulling a sleigh" said Dr Claus, chief scientist of the Improbable Division of NASA.

"Of course, when we checked the orbit of Mars, we found it was Christmas there and every thing was explained."

NASA and NORAD officials have designated this flying target as definitely friendly and will be watching on Dec 24th for its visit to good Earthling children.

From The Editor's Desk

TOYS! Ever since we were children Christmas has been the season for toys. As we grew older and, perhaps more cynical, we have found that only the price of the toys has changed. Nowhere is that more true than in the hobby of astronomy.

I am sure that there has been many a hint dropped at the supper table about that new 'toy' that you would like to see under your tree or in your stocking that will improve your observing for the coming year.

It would be great to have some reviews of this equipment for the EH when you have a chance to get to use it. Sadly, this is also the season for clouds and bad weather. At least we can play with our toys indoors when it is cloudy!

From all of us at the HAA, a very Merry Christmas and a Happy and prosperous New Year!

Tim Philp, Editor

Inside this issue:

The HAA proudly presents the re-opening of the W. J. McCallion Planetarium

Burke Science Building, McMaster University, on Tuesday January 13, 2009.

The 8PM show is sold out, but there are a number of tickets remaining for the 7PM show. Tickets are available for $5 each on a first come, first served basis. Your last chance to get your tickets will be the January meeting of the HAA on Fri, 9 Jan 2009.

HAA 2009 Calendars are still available for $20 each. These are a great Christmas gift idea and contain lots of useful information about astronomy events in the upcoming year.

Contact Don Pullen, HAA Treasurer, for your copies.

Treasurer's Report— By Don Pullen

(Unaudited)

Cash opening Balance (1 Nov 2008)	$3759.11
Expenses	$2076.83
Revenue	$ 833.50
Closing Balance (30 Nov 2008)	$2515.78

Notes:

- **Major expenses included:** HAA 2009 Calendars ($1288.20), Insurance ($702.00), Nov EH printing ($70.63), 15th Ann Dinner refund ($16.00)
- **Major revenue sources included:** Memberships ($205), HAA 2009 Calendars ($580), 50/50 ($33.50), Clothing ($15)

From the Chair

by Steve Germann

The month of November has been a gloomy one for me, astronomically speaking. I could not get out to observe on the few clear nights there were. However, the HAA councilors have been active, planning and organizing many events for the coming months. They have come up with great ideas for next year and plan a monthly community outreach event, near the first quarter moon, events for the membership, and trips.

Our list of distinguished speakers is keeping ahead of our schedule. Next month, Dr Paul Mortfield, an accomplished astrophotographer, scientist, and celebrity, will be addressing all who attend our monthly meeting.

Before our next meeting, the IYA will begin, with the Canadian 'Kick-Off' in Ottawa.

Some of our members will be there, especially to see our observing director, John Gauvreau, who is invited to be there as Galileo.

Our members have contributed excellent photographs to the HAA calendar, and it's available for purchase both for yourself and as a gift.

The Binbrook Conservation Area, an oasis of darkness in a light-polluted metropolitan area, is a great resource to our club. Our connection to that location is to be treasured, and used. We can look forward to more organized events for our members at Binbrook, in the coming season.

Meetings are always well-attended and are a great place to learn about the practical aspects of hobby astronomy.

Our public outreach, in Hamilton and nearby communities, this year will take advantage of the earlier sunsets of Winter and early Spring. That should make it possible for more families to attend with their children.

We had a scare this week for our meeting location. As always, please check the website before venturing out on meeting night. The Spectator Auditorium is a great place for us to meet, but it can be cancelled on short notice, depending on events beyond our control. We always prefer to meet there, but we are preparing a list of alternate locations available for use in a pinch.

Coming soon is our trip to the MacCallion Planetarium, newly renovated, at McMaster University. I hope you all have a chance to attend this event. The trip is near full moon, so although the skies might be clear, there will be better 'seeing' indoors that night. We had a great response, filling the 8 PM booking so fast, we were able to quickly book a second show, for 7 PM. If you have not got tickets yet, please consider the 7PM show and make reservations.

Laser Weapon?

By Steve Germann

A few weeks ago my attention came to an article about laser safety, and about 'attacks' on landing aircraft by laser wielding miscreants.

In that media report, there was an interview with an astronomer, who intimated that the lasers were likely the kind used by amateur astronomers in public outreach.

Since we at the Hamilton Amateur Astronomers also use those lasers, I think it's important to comment on laser safety, and to put things in perspective.

The main purpose of this article is to provide useful information to anyone challenged on laser safety, and to protect our members.

In the media report, the laser was described as being able to "cut thick cardboard". Well, the most powerful hand-held laser I have ever seen advertised is a 300 mW version.

This is much larger than the pocket-size versions we use. It's about the size of a flashlight. Our lasers are from 5 to 50 times dimmer than that.

The amount of power a 300 mW laser can bring to a focus is about the same as a magnifying glass, at noon, the size of a loonie. Given that the beam is not very sharp, (a couple of millimeters minimum,) cutting thick cardboard with that would not be something you do by accident. I doubt you could do it on purpose. A typical laser, at 10 mW, is the same as a magnifying glass the size of a dime.

There are much more powerful green lasers available, for light shows at concerts and ball games, which are about 25-100 watts. These are not 'hand-held'.

How bright is a laser, as viewed by the pilot of a plane, at distance? The effective isotropic power of a 10 mW laser is about 60 thousand watts (!).

Shining it in the eyes of someone landing a plane a few hundred meters away would be dazzling.

More than 1 km away, it would be bright but would cause no permanent damage.

As the article points out, the danger to aircraft from laser pointers used in astronomy is more a product of media hype than science fact, however, common sense should be used when pointing lasers at the sky and avoid shining them at aircraft.

At any distance, if the pilot saw it, he would know it's a laser, probably consider it an 'attack' and report it.

During astronomy outreach, we point the laser into the sky. We do not intentionally point it at airplanes. The laser lights up about one six-millionth of the sky.

Hand-held, it's impossible to keep the beam pointing at the cockpit

of an airplane at cruising altitude. At most the pilot would see it for a tiny fraction of a second, and never again. It would appear no brighter than a distant stadium light, although it would be green. Against the dark background of a deserted place, it would be noticeable.

If you had super-human ability to aim and track the laser and remain pointed at the plane for a second or more, the laser light would be as bright a spot, coming from the ground, as you would see if shined on a surface about 10 meters away. That's still pretty bright. At night, annoyingly bright. However, looking at that dot on a tree 10 meters away does not damage your vison, though it might cost you your night vision for a time.

Also, the distant pilot will need to be looking at you. He will not see green glare off items inside the cockpit.

There's one very important safety risk of lasers though. The most important person you need to protect from laser exposure is yourself (!).

Inside a hand-held laser, there's an Infra-Red (IR) laser and a special crystal that doubles the frequeny, converting IR light into green light. The process is temperature dependent.

If the crystal is too cold, the IR light passes through, unchanged. This means, in the cold, your laser might not light up. DON'T LOOK INTO IT. It's still putting out powerful IR light that could damage your eyes. The button might freeze up too... so don't assume it's off when cold and not working. Put it in an inside pocket and let it warm up, and when using it, hold it so that it stays warm.

The green laser has revolutionized astronomy outreach. Our ability to point out constellations and celestial events has improved by a quantum leap. In responsible hands, it is an important tool, and will remain so for a long time. It's important for the astronomy community to defend responsible laser use in outreach.

Moonrise... its' a Good Thing!

Story and Photo by Jackie Fulton

In the early evening, Easter weekend of 2007, I found myself driving on Rymal Rd (hwy 53) towards Stoney Creek. Coming over the graduated hill I was overwhelmed by the sight of a very spectacular full moon rising before me. The full moon seemed positioned at the end of the ribbon of highway that appeared to run right into it. It filled the horizon from streetlight to streetlight, and then some, on either side of the road. I pulled over to the shoulder and with camera in hand to capture this moment -much to the dismay of oncoming traffic.

Moonrise over the Burlington Skyway taken from the Sydenham Road look out

Unfortunately, shooting at night without a tripod has disastrous results, so I decided to try again the following night. The next night I was ready. I checked the Clear Sky Clock to pinpoint the exact time of moon rise and found the perfect vantage point on the edge of the escarpment on Scenic Drive. Opposite my view was the darkened silhouette of the escarpment. The tripod ready, I waited and was not disappointed.

There is nothing more lovely than the sight of the full moon as it breaks the horizon. It starts with a warm glow, followed by a dazzling ray of light bursting into the night sky. At the onset a rich orange ball, the moon rises quickly. Again missing the perfect image, I cursed my lack of photographic skill deciding to try, yet again, the next night.

Since that time the 'next nights' have continued. I am still chasing the perfect moon rise as each one, depending the season or the weather, offers a different viewing experience. I try from a variety of lookout locations in the area too. The Sydenham Road lookout gives a wonderful view of the moon rise behind the skyway bridge as it lights up Hamilton Harbour. You are treated to moon mirages on the water, through fog, as well as perfect nights.

One of my favorite locations is McQuestern Bridge off York Boulevard, near the Royal Botanical Gardens. Being careful to choose a permitted parking spot, the observer gets double their viewing experience; the sunsets over Coote's Paradise to the west are also renowned for their beauty. It is not unusual to see cars pulled to road side to watch some of the more spectacular ones. However, after the sun is set, be sure to stick around. Shortly thereafter the moon rises over Hamilton Harbour in the east. You need only to cross the road to complete a wonderful evening of observing nature at its finest moments. So if you get a chance, consider observing the moonrise, it only takes a few minutes of your time, which you will not regret.

Preaching the virtues of the full moon rise experience, there have been a few converts among us, who will make the trek each month. Some are long time astronomers who have never stopped to notice, after all it's the full moon that sends astronomers scurrying, for it is the bane of our existence. Among my astro-buddies I have become renowned for my moon rise hiatus. One remarking, that when he saw the full moon he immediately thought of me.....and that's a good thing.....I think.

The Silver Braid

By John Gauvreau

"Many a night from yonder ivied casement, ere I went to rest,

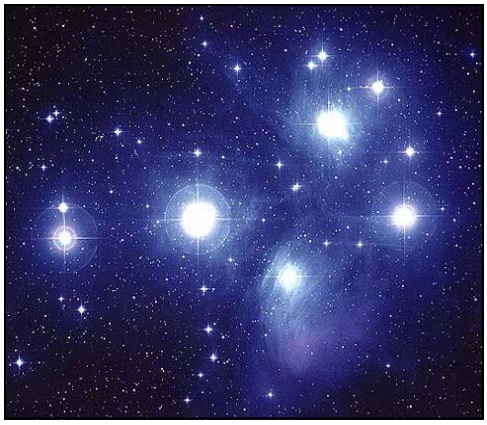
Did I look on great Orion sloping slowly to the West.

Many a night I saw the Pleiads, rising thro' the mellow shade,

Glitter like a swarm of fire-flies tangled in a silver braid."

Alfred Tennyson penned these words as part of his great poem, 'Locksley Hall'. They are perhaps the best known of his writings with an astronomical theme, but they are certainly not the only ones. His poetry also includes references to the northern lights, the discovery of new moons around the planets and the rotation of the planets around the sun. Over the course of his life in 19th century England, he achieved great success and popularity as a writer, something that many contemporary artists failed at. He was even given a seat in the House of Lords, after accepting a peerage from Queen Victoria, who was a great admirer of his. As such, he is known as Alfred, Lord Tennyson. I became an admirer of his when I first encounter pieces from a work of his called 'Idylls of the King', which is a telling of some Arthurian legends. As a sign of his success, there are many phrases of his from other works that have passed into common usage, such as "tis better to have loved and lost, than never to have loved at all", "Theirs is not to reason why, theirs is but to do and die", and "nature, red in tooth and claw". This is often used in association with the idea of natural selection, which was popularized though "On the Origin of Species" by Charles Darwin, a countryman of Tennyson. An exploration of Tennyson's adoption of science and technology into his life would certainly be a fascinating study, as there seems to be considerable cross-over between the writings of these two contemporaries, and Tennyson's struggle to resolve the conflict between his religion and science is evident, and hardly surprising considering the atmosphere of the time. A curious byproduct of this is that Tennyson had himself recorded reading his own works by none other than Thomas Edison.

We, however, will focus on that single and spectacular description of the Pleiades. To set the stage, those nights he refers to, in the first line printed above, took place in his youth. He is recalling looking out his window and taking in the last of the day before going to bed. He recounts seeing Orion setting in the west, and so it must be a spring evening. We can imagine how soothing that must have been to take in the fresh spring air through an open window and enjoy the warmth of season after so many long, cold winter nights. But the second phrase describes the Pleiades "rising thro' the mellow shade". We all know that the Pleiades rise in the east in the fall and winter seasons. Perhaps you have enjoyed a similar view recently. One of my favourite astronomy books, 'Starlight Nights' by the 20th century American Leslie Peltier, describes a similar scene, and in fact he cites Tennyson's work and associates it with one his first encounters with the stars, an encounter that would send him on a life-long journey. Robert Burnham Jr., another American and author of 'Burnham's Celestial Handbook' devotes so much space to them and speaks so reverentially of them , that it can hardly be imagined that he held them in any lesser regard than Peltier.



An open cluster some 440 light-years distant, the Pleiades cluster sits only 12 degrees away from another prominent open cluster, the Hyades. Although slightly more distant from us, it appears much larger in the sky and the stars in it are more loosely distributed. How interesting to compare them side by side in the sky. Naked eye observations of the Pleiades are assumed to reveal 7 stars, and as such they are referred to as the Seven Sisters. These sisters, who are name for us in a poem by Aratus in the 3rd century BC, are Alcyone, Merope, Celaeno, Taygeta, Asterope, Electra and Maia. Along with their parents, Atlas and Pleione, these are the names of the nine brightest members of the star cluster. Can we really see seven stars, though? Certainly in the light polluted skies of the city we can not, and even under good skies most people only see six. This seems to be due to the close proximity of some of the fainter stars to the brighter ones and ending up lost in their glare, and in the past it has been speculated that a seventh member appeared brighter than it does today. There are fully eleven stars (those sisters and parents mentioned above, plus two others) that are magnitude 6 or brighter. That should be possible to observe in a decent sky. Some people with extraordinary eyesight have indicated that they can see many more that this, and the famed Sky and Telescope columnist, Walter Scott Houston, tells of amateurs who reported seeing up to 16 individual stars. This is certainly plausible, since there are 16 star *brighter* than 7th magnitude. Even Peltier claimed he could regularly see 12 or 14 on a good night. I am not so lucky, and can make out only eight under good conditions. Don't be dismayed if you don't see as many as Peltier; more than eight is considered remarkable, and most people see only six.

But let us look deeper in to the sky. If we look at some data on the individual members of the cluster (which is made up of thousands of stars) we

The Silver Braid— Continued

By John Gauvreau

see that there are 16 stars that are 6th magnitude or brighter and 22 stars that are 7th magnitude or brighter. Few of us have the opportunity to get under magnitude 7.5 skies, and even fewer have the eyesight to take advantage of the situation should it arise, but could we be seeing these stars anyways? As I said, I can count up to 8 stars in the Pleiades, but under a good sky they seem to be set in a background glow. It truly seems that I am on the verge of seeing more stars. Of course, as it is whenever we observe, we must be cautious that we are seeing what is there and not what we expect to be there. Knowing that there are more stars to be seen may lead me to believe that I am actually seeing them. There is another possible explanation though. Could this glow be the accumulated light of the unresolved fainter stars? We know that there is a great amount of nebulosity surrounding the cluster, but it is a challenging object in a scope, and although there have been reports of naked eye sightings, I think it more probable that these observers were seeing fainter cluster members.

Counting the naked eye members of the Pleiades can be a quick and fun task when out under the night sky at this time of year. You need not be out on an observing session; you might simply be walking from the car to the front door upon arriving home from work. It takes only a few seconds to bring a little astronomy into your evening. First look straight at them, for this will cast the image on the part of your retina that is most closely packed with cones. This gives you the best resolution and your best chance of separating close members of the cluster. You will be able to count the five brightest members easily, and you will know which ones I mean right away. The stars Atlas, Alcyone, Maia, Merope and Electra look like a very little dipper. Perhaps you can also see Taygeta, to bring your total to the traditional six . If not, then now is the time to try averted vision. By looking slightly away from the cluster you loose some definition, but by placing the image on a part of the retina that has more rods, you can see fainter stars (the rods are more light sensitive than the cones, but there are almost no rods in the center of your vision). A little experimenting will find you just the right spot to look so that you can see the most stars. The seventh star is a long term variable, ranging from magnitude 4.8 to 5.5, but how well you see is unlikely to be greatly affected by this cycle. This seventh star, Pleione, is also right next to the brighter star Atlas, making it even harder. If you succeed in seeing it, then you have a good sky and you should try for numbers eight and nine. Calaeno and Asterope are only a fifth of a magnitude apart in brightness, but I always seem to miss out on that ninth Pleiad! Some helpful tricks include waiting until the cluster is

The Silver Braid— Continued

By John Gauvreau

high in the sky, and choosing you weather well; a transparent night with good seeing will certainly help. I mentioned that we must be careful not to bias ourselves before observing, but eventually you will come to have a mental map of the Pleiades in your head, and know just what to look for. When that happens, use it to your advantage, and concentrate on those regions where the components should be. After that, you are into the group of stars that I can not make out with my eye, but only see as that background glow.

In the end, I am asking, is this Tennyson's silver braid? Are his fireflies tangled in the unresolved glow of background cluster members? I think he could have been observing unresolved background stars, and if he was, then how fortunate for us, for how could we describe them more beautifully than he did. The "swarm of fireflies in a silver braid" tells us not just how lovely the view from his window was, but a little about the composition and distribution of the stars in the cluster.

Where are our 21st century poets? Where are those that can put in to words what we see at the eyepiece. You and I share a common experience and understand why we go out to remote locations and endure the cold temperatures and discomfort of the night. We amateur astronomers have an unspoken bond, an inside joke that few can translate to others. How do we lure the poet and artist to the eyepiece, so that they may speak for us?

Agnes Clerke, in 1907, referred to the Pleiades, what she called the "immemorial group", as "the meeting place in the skies of mythology and science" How true, and how true also that "these stars riveted, from the earliest ages, the attention of mankind; a peculiar sacredness attached to them, and their concern with human destinies believed to be intimate and direct".

Go out yourself at this time, and count the Pleiades with just your eye, or fill your binoculars with the grandest of all clusters, or try to catch a glimpse of that nebulosity through your scope, and experience that intimacy and directness with those that came before you; Clerke and Burnham and Peltier and Tennyson, and of course, the Pleiades.

I wish you, as again I quote from Tennyson, nights with;

"mellow moons and happy skies,".

The Sky this Month—by John Gauvreau

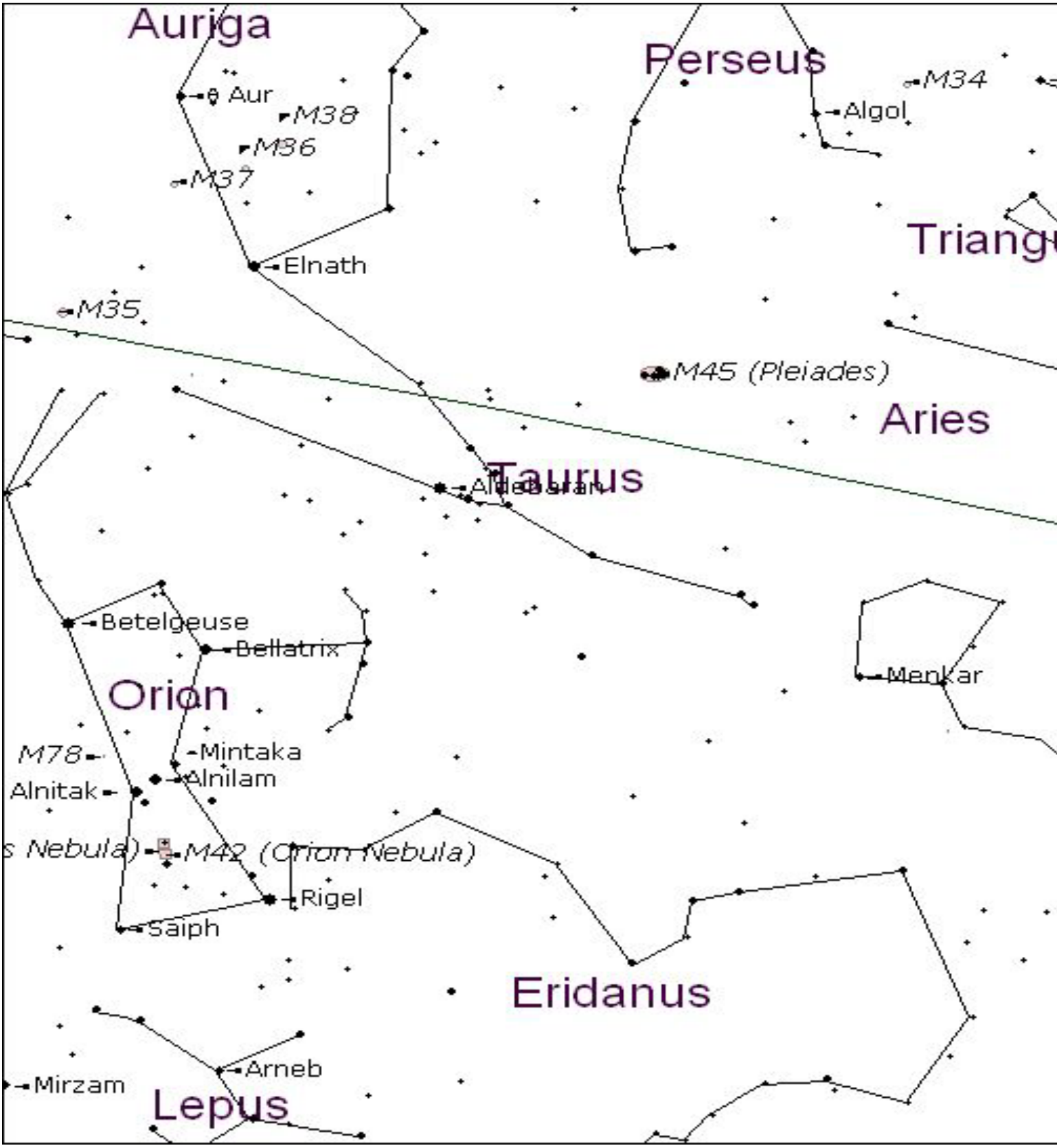
Each year at this time I enjoy the arrival of the new season's constellations like **Taurus**, **Orion** and **Auriga**. I also enjoy the fact that the early nights mean that as the summer constellations like **Cygnus** and **Lyra** sink into the west earlier and earlier, the sun also sets earlier, thus prolonging our time with the summer constellations, and giving us a chance to recall warmer evenings. Remarkably, we are able to view both the summer and winter constellations at the same time (the reverse happens when the winter constellations seem to disappear all to soon in the spring). But don't be fooled! Step outside; it is winter. Look at the calendar; it is December.

The calendar that we use today, the **Gregorian Calendar**, has been put together and refined bit by bit over the centuries. One of the odd results of our calendar's tumultuous history is that the final few months of the year are named for their numerical position in the order of things; namely, September, the seventh, October, the eighth, November, the ninth, and December, the tenth month. You see it; October, the eighth month, like an octopus has eight legs and an octagon has eight sides. And just like 'decimal' means divided in to ten parts, December means 'the tenth month'. Except of course, October isn't the eighth month, and December isn't the tenth, it's the twelfth. That's because the calendar year originally started in March, with the **vernal equinox**. Spring arrives and the **Earth** is renewed. How better to mark the occasion than to begin a new calendar year? If we still did that then the tenth month would be true to its name, and truly be December.

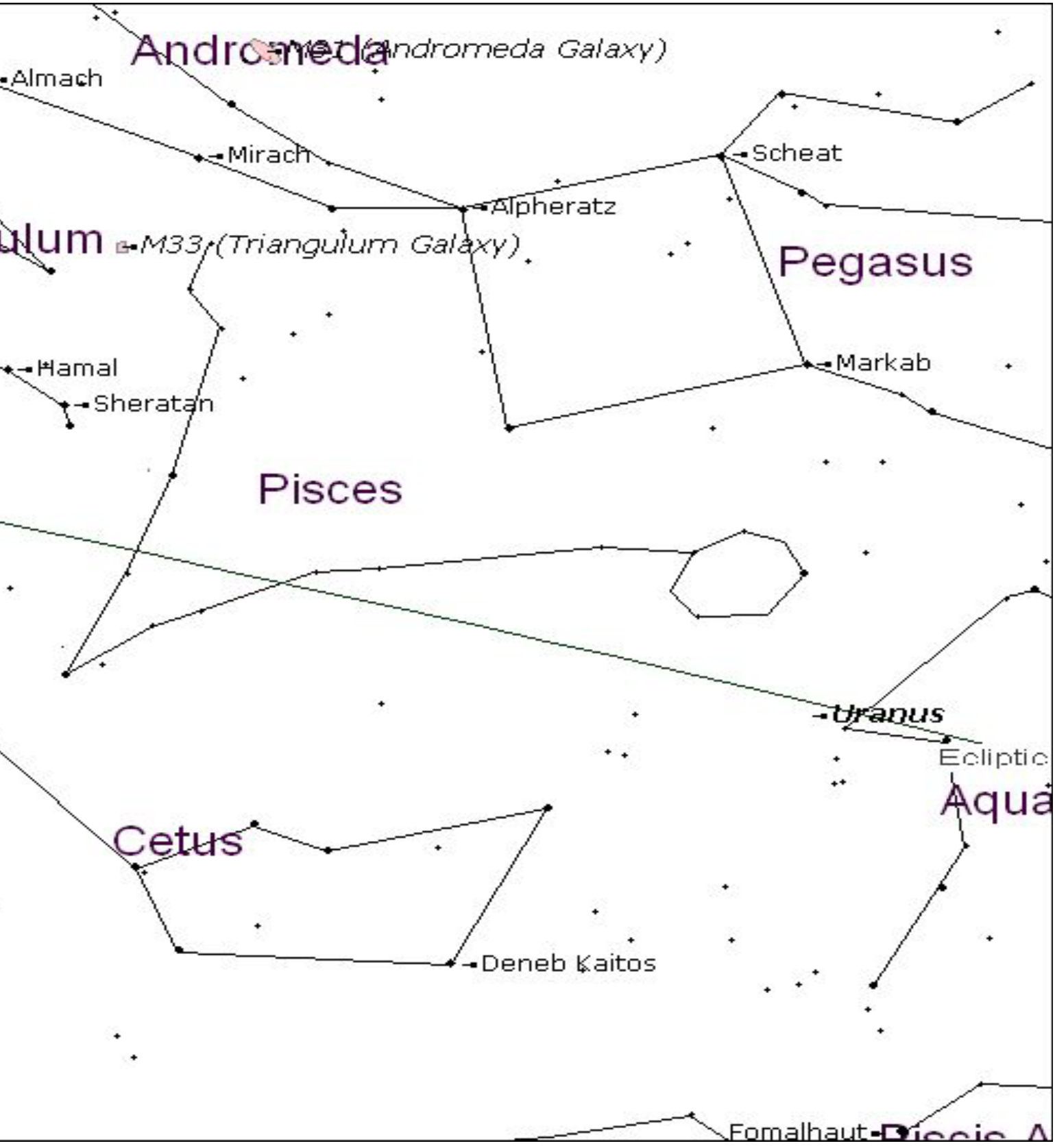
Now, of course, December is the last moth of the year, and with it we bid farewell to 2008. In December we also bid farewell to **Jupiter**, named most appropriately for the greatest of all Roman gods. **Jupiter** has been our companion in the night sky for most of this past year, encouraging us to rise early and go outside to enjoy the nice spring weather, then sharing the **Milky Way** with us through the summer months, next providing a rare beacon of brilliance in an otherwise dim autumn sky, and finally pairing with **Venus** in a **planetary conjunction** that may have done nothing to advance the science of astronomy, but did wonders to remind us just how beautiful the night sky can be.

Venus now takes **Jupiter's** place, and brings in the new year for us like a celebratory firework. For the next few months it will be unmistakable in the western sky after sunset. Watch as it rises higher in the sky and drifts south, and then reverses direction before plunging into the western horizon next March. Telescope owners should also keep an eye on **Venus'** changing size and phase. It is slightly **gibbous** now, but before our next meeting in January, and our next issue of **Event Horizon**, it will show only half its face, much like a first quarter **moon**.

The Sky t


Auriga
Perseus
θ Aur
M38
M36
M37
M34
Algol
Elnath
M35
M45 (Pleiades)
Aries
Taurus
Betelgeuse
Bellatrix
Menkar
Orion
M78
Mintaka
Alnilam
Alnitak
M42 (Orion Nebula)
Rigel
Saiph
Eridanus
Arneb
Mirzam
Lepus

his Month


Andromeda
M31 (Andromeda Galaxy)
Almach
Mirach
Scheat
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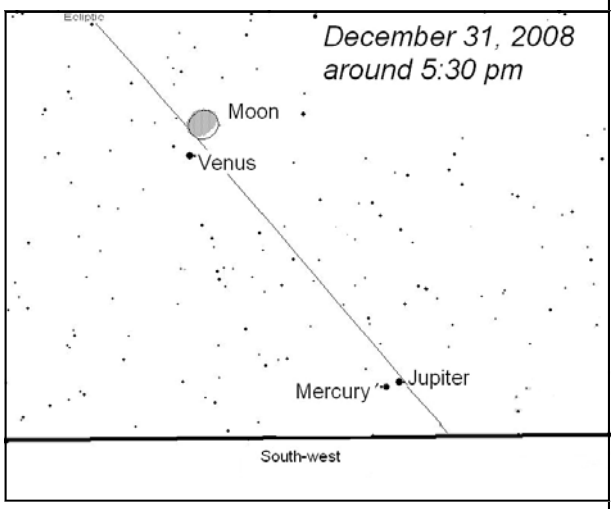
ulum
M33 (Triangulum Galaxy)
Pegasus
Hamal
Sheratan
Markab
Pisces
Uranus
Ecliptic
Aqua
Cetus
Deneb Kaitos
Fomalhaut

The Sky this Month (Continued)—by John Gauvreau

Finally, those with telescopes, binoculars or even just a good view of the west should take a few minutes out of their festivities on December 31st, New Year's Eve, to step outside and watch the crescent Moon pass just 3 degrees above Venus. How better to mark this special night than to marvel at the sight of the night's two brightest luminaries drawing the year to a close by drawing an exclamation mark in the sky!

Mercury makes one of its all too brief but treasured appearances in December. During the final days of the month it rises out of the sunset glow as if to meet **Jupiter** and escort it into the west. On December 31st, that same night that sees the **Moon** and **Venus** together, **Mercury** will join **Jupiter** to complete the gathering. Only a little over a degree apart, telescope owners should be able to see both planets in the same low-powered field of view, and everyone, with or without a 'scope, will be able to marvel at how close they look to each other. Do they look best in the telescope, binoculars, or with the naked eye? I think that a binocular view will be lovely, but with the **Moon** and **Venus** above, perhaps it will be best to take it all in at once with the unaided eye. **Jupiter's** large **moons** are about the same size as **Mercury**, and yet they are 6 times farther away from us. Think about that as you look at them all in the telescope, and imagine these distances in your mind. Can you visualize the three dimensional nature of the solar system?



Before the month's end **Saturn** will be rising by 11pm, and for early morning observers it will be due south and 50 degrees high by 5am. The **rings** are nearly edge on, and a view of **Saturn** may be just the thing to ease the passing of **Jupiter**.

Putting the **planets** aside, we must not forget that December brings one of the best **meteor showers** of the year. The **Geminid Meteor Shower** will peak on the night of the 13th. Unfortunately, this year there will be a very bright moon in the sky, but the **Geminids** are known for producing very bright **meteors**, so we may still see some good ones.

Let me hear about your observations. The opportunity to share our experiences is one of the greatest benefits of belonging to an active club, and I will be interested to know how all these comings and goings in the sky appeared to you. December 21st marks the **winter solstice**, and this season brings the longest nights of the year. I hope that you can take advantage of the long darkness and enjoy the night sky. And in these cold days and dark nights, I wish all my fellow members and those they treasure, all good things in this fine season and the new year ahead.

Through the Looking Glass

by Greg Emery

The Holiday season is fast approaching which means several things: sale prices and cold weather. The cold weather is a mixed blessing for the amateur astronomer. The brutally cold winter nights bring with them some amazingly clear and steady skies. The extremely cold air typically holds very little water vapour, combine this with low winds and we have the opportunity for excellent viewing.

Viewing the Winter Milky Way under these conditions can be very rewarding. Problem is, how do you enjoy the views for more than a few moments without freezing to death?

Proper dress and preparation is more important for winter viewing than for any other season. The most important thing to remember, especially for the first few times you view in the winter, astronomy is essentially a sedentary hobby. You spend long periods of time not moving or exerting energy. This is a wonderful way to enjoy a late night view of the heavens, but a terrible way to stay warm. You must pay more attention to your dress than when walking the dog, shoveling the snow or going for a walk.

A trick for keeping your feet warm that I was told and now follow, buy your footwear a half size bigger. The extra room can be used for heavy socks and to wiggle your toes. Keeping your toes moving and comfortable truly helps. Granted some grace and dexterity go out the window when your flopping around in the bigger boots.

While the winter offers spectacular objects to see and stable atmospheric conditions, proper clothing is essential to enjoy winter astronomy.

At the other end of the spectrum is headwear. I never wore a hat, once I was old enough to allegedly make my own decisions. My wife showed me the benefits of a good hat. My favourite, and warmest, hat is the Russian style hat with ear flaps (Think of Cousin Eddie in National Lampoons Christmas Vacation). That hat is so warm, that I can only wear it on very cold days. The amount of energy that escapes from your head is truly amazing, cover it up!

Experts will tell you to dress in layers, with the inner most layer being of a material that will wick away moisture, and the subsequent layers being not too bulky. I personally find that if my head and feet are really warm, I do not need too many layers under my winter coat. If your coat is not long, consider multiple layers on your legs as well.

I have yet to find a good pair of astronomy gloves. You need to be able to do some fine manipulation with your hands while attempting to not get frostbite. I usually settle for a warm pair of gloves (mitts are better) that are easily taken off and put on. I have real problems handling eyepieces or adjusting the focus with heavy ski gloves on.

A trick I learned for myself (everyone else probably knew of this but considered it obvious, whereas I had to learn the hard way) is how to prevent your eyepieces from fogging or icing up from your breath. Your breath can wreak havoc with cold glass surfaces. I put a scarf or balaclava across my face, this prevents my breath from coming out underneath the eyepiece.

A nice thermos of coffee, hot chocolate or anything else will always help.

Plan that Star-party!

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My Foray into Binoviewing—Part III

by Glenn Muller

To bring you up to speed, Part 1 of this trilogy (Event Horizon – December 07) detailed my early experiences with binoviewers at star parties and the selection and subsequent purchase of a William Optics set.

In Part II (Event Horizon – January 08), I described why a set of correctors from Siebert Optics were necessary to bring them to focus in our Newtonian scopes and the pros and cons of using binoviewers.

Since then, Gail and I have enjoyed some incredible two-eyed views of the Moon, Saturn and Jupiter, yet, at the back of my mind was always the thought that binoviewers can also enhance the observing experience with another instrument – the Coronado PST.

At just over 15" (38cm) long with an aperture of only 40mm, the PST is probably the smallest scope any serious amateur astronomer will ever own. At first glance one wonders if anything worthwhile can be seen through it, however, when properly "tuned" this specialized little unit shows amazing detail of the Sun's surface and filaments of flame, called prominences, extending from the limb.

The image is small but, once the eye is trained, subtle changes to the features can easily be detected from hour to hour. Where premium eyepieces will naturally improve the view, binoviewers can take it up another notch from there.

My first look through a binoviewer -PST combination was a few years ago, at Starfest. Within minutes of stopping at the Denkmeier booth I knew that if I ever acquired a PST I would want to get binoviewers to go with it.

As it turned out, we got the binoviewers first so when it came time to purchase the PST the decision to do so was that much easier.

Like most Newtonian scopes, PST's also require a corrector set to bring binoviewers to focus. Denkmeier sells a corrector specifically designed for their brand for $179. For other makes, like our William Optics unit, $119 will get you a corrector set from Siebert Optics.

The Siebert set consists of an extension tube, an adapter tube, and a lens cell. The extension tube slips into the PST's focuser shaft, the adapter tube slides on top of that to lengthen the light path, and the cell with the corrector lens screws into the bottom of the binoviewer which is then inserted into the top of the adapter tube. Six nylon screws help to secure the pieces in place.

The corrector lens acts somewhat like a Barlow in that it magnifies the image 1.3x. This makes 20mm eyepieces seem more like 14mm ones, which is fine since it gives you a closer view of the target while maintaining the comfortable eye relief of low power ep's.

Though this combination will fit the Sun's entire disc in the field of view, the PST does have a "sweet spot" which necessitates moving the image around in the FOV to bring individual regions into better focus.

All of the advantages to binoviewers when paired with other types of scopes are as relevant, if not more

My Foray into Binoviewing—Part III -(Continued)

by Glenn Muller

so, with the PST. However, there are some mechanical considerations to this setup.

After inserting the assembled binoviewer/corrector combination into the PST's focuser shaft the rubber cup of each eyepiece is about 14" (36cm) above the OTA. This requires a sturdy mount and, depending on what kind you have, you may have to rig up or add to your counterweight system to balance the rig.

I use an alt-az mount with manual slow motion controls. I have read that an equatorial mount is not as well suited because of the oblique angle it can put the unit as it tracks the sun.

To get your particular make of binoviewers to focus you will likely have to slide the adapter tube up the extension tube – this takes a little experimentation after which you tighten the nylon set screws to hold the correct length. This really only takes a minute but, once you have done that, it's a good idea to use a fine black marker to indicate where on the extension tube the adapter tube lines up. That way you can quickly find the correct length, again, if you disassemble the pieces.

One other tip, that isn't exclusive to the use of binoviewers but comes into play with the PST, is to put some sort of blanket over your head to block out daylight when observing. This really enhances the contrast of the views and the best design for this seems to be two rectangles of material sewn back to back – one silver to reflect the sun, and the other black for its light-baffling quality.

There are several variations sold online for $35-$60 but you could probably make your own with a piece of dark cloth and an inexpensive mylar survival blanket.

Speaking of DIY, there is a storage case designed to fit the PST which retails for about $70. However, the article "A Case For DIY", also in the December '07 Event Horizon (goodness, that was a good issue!) describes how you can make a sturdier custom case for about $50. So I did. Here's a picture of the case I made to house the PST, Binoviewers, and related accessories.

In closing, the price of decent binoviewers is now less than many high-end eyepieces – and, depending on the rate of exchange, so is the cost of a PST. Put them together and you definitely have a situation where the whole really is greater than the sum of the parts.

Member of the Month—Thérèse Emberly

by Tim Philp

The purpose of the member of the month column is to highlight a member of the club—often someone whom you have seen at a meeting, but may not have had the opportunity to get to know.

We have certainly had many of the more well-known members featured, but this month, I would like to feature someone who is often at the meetings, but tends not to hog the spotlight.

I have known Thérèse Emberly for several years and she is a dear friend of mine. Members will recognize her as the tall blond who keeps former HAA chairman Mike Spicer in line—a difficult and thankless job, I am sure!

Thérèse and I first observed together at Binbrook when I took her out there to meet some of my friends. She had never looked through a telescope and seemed a bit unsure of what all the fuss was about.

Her first experience of actually seeing the wonders of the universe was fairly typical of newcomers to the hobby and she was hooked. Of course, there was a lot of mild teasing about 'geeks' with their headlights, but it was all in good fun.

Thérèse bought a telescope from Mike Spicer and we took it up to a nice dark-sky site near Dunedin where her mother has a house. She spent hours looking at the sky and became hooked on the hobby.

Living in Kitchener with Mike Spicer, she has a telescope mount fastened to the railing of her balcony—it fits right in with the other apartment's satellite dish equipment. Of course, no site in the city can be ideal, but her solution is the next best thing.

Thérèse works for Magna corporation where she is an expert in plastics manufacturing and plating. She travels extensively for her job which leaves her little time to enjoy the hobby of astronomy. She does, however, get out as often as she can

Recently, Thérèse has become interested in astrophotography. She bought a DSI pro camera, but quickly graduated to the Cannon DSLR that has become so popular. Some of her pictures have been published on the website and in the EH, particularly her prime focus pictures obtained by holding the camera up to the lens and shooting what the eye would see.

While this technique does not produce the long exposure pictures that are a favourite of many of our members, it has the virtue of creating good pictures with little muss or fuss.

With Mike as her guide, I am sure that she will progress in the hobby and learn a great deal.

Perhaps we will see her do a presentation sometime soon at a monthly meeting of the HAA.

In any case, I am pleased to present Thérèse Emberly—Member of the Month.

Radio Astronomy

by Tim Philp

The picture that most people have of astronomers is of serious people peering through large telescopes at the inner workings of the universe. Of course, that picture of astronomy has not been true for at least a hundred years. Everything changed when photography was added to the arsenal of astronomical tools.

In fact, many professional astronomers have never even looked through a telescope!

Today, astronomers are to be found peering intently at their computer screens at pictures and data gathered by many different kinds of instruments. In fact, much of the data that they gather does not even come from what most people would think of as a telescope.

Optical telescopes only gather information about the universe from a very narrow band of frequencies that we call visible light. Light, however, is much more than just what we can see. When you feel heat on your skin, you are feeling infra-red light. You cannot see it, but it is the same as the light that your eyes are sensitive to, just a lower frequency. In fact, that is the difference that we sense as colour – light at different frequencies.

The same is true of X-rays and Gamma-rays; they are also light at different frequencies. It is also true of radio waves. Radio waves are simply light that has a very much lower frequency. It is this kind of light that astronomers are using to probe the innermost secrets of the origin of the universe.

Indeed, it was radio astronomy that produced the first solid evidence that the Big Bang was real. Optical astronomers had noticed that all galaxies, except the ones nearest to us, were moving away from us at speeds which increased the farther away the galaxy was from the Earth. It was theorized that the universe was expanding. When they ran the clock backwards, all galaxies must have been at the same place about 14 billion years ago.

Radio astronomy has helped unravel some of the secrets of the universe. This picture shows the 6 metre horn antenna used by Penzias and Wilson to discover the cosmic background radiation. Their efforts won them the 1978 Nobel Prize in physics.

Now there were many competing explanations for this phenomenon, such as 'tired light' or errors in the distance estimates of distant galaxies. What tipped the balance toward the Big Bang theory was radio astronomy.

When the universe was formed, the temperature and pressures must have been unimaginable. As the universe expanded, this matter would cool the same way a gas cools when it is released from pressure. Over the billions of years that the universe has existed, this initial radiation should be detectable. The theory said that as the universe expanded, the wavelength of this 'light' should have gotten longer. This was one of the predictions of the Big Bang theory by cosmologist George Gamow in 1948.

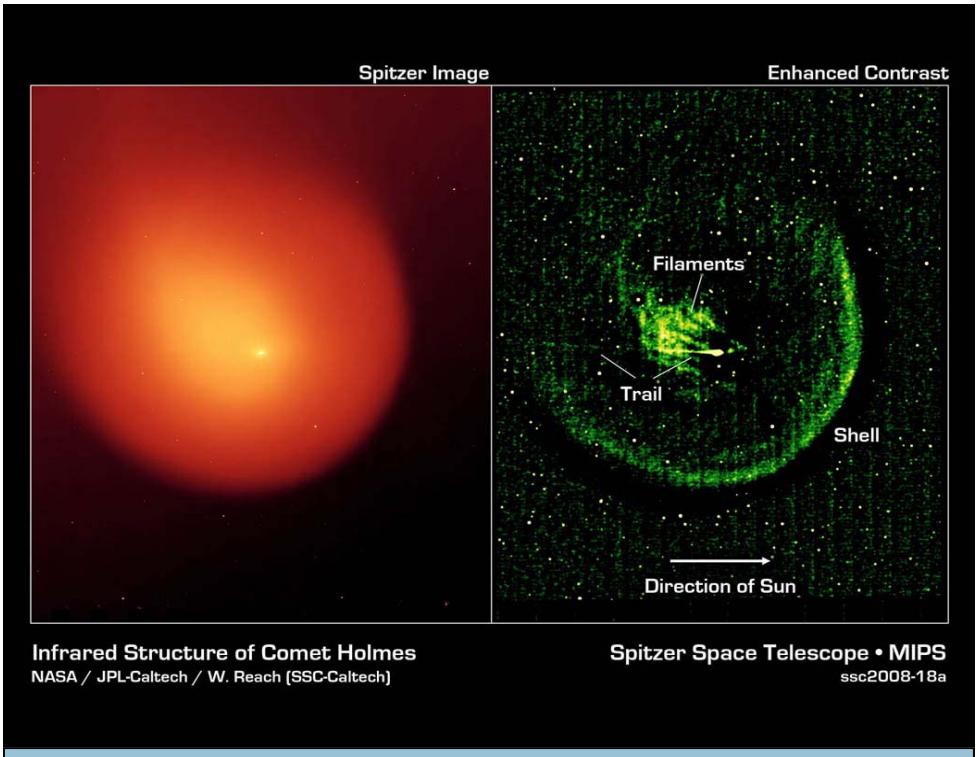
Gamow predicted that the Universe should be filled with this "relic radiation left over" from the Big Bang. (Gamow calculated a temperature of 15 degrees absolute; Dicke & Peebles at Princeton recalculated the value in 1963, predicting a Temperature near 3 degrees absolute.)

Using a horn-shaped microwave antenna , Penzias & Wilson made the first glimpses of the Cosmic Background Light quite unexpectedly. Since their discovery the evidence has become stronger and stronger that we are seeing the light from the Big Bang. Penzias & Wilson received the Nobel Prize in Physics in 1978.

Today, radio astronomers still probe the universe for answers to the fundamental questions of cosmology. Radar has mapped other worlds in our solar system and structures in our galaxy, long hidden by dust, have revealed themselves through infra-red and radio astronomy. Astronomers are starting to use the whole spectrum of light to learn more about the origin of the universe.

Space Place—The Chemical Weather Report

One year after Comet 17P/Holmes shocked onlookers by exploding in the night sky, researchers are beginning to understand what happened.



Comet Holmes as imaged by the multiband imaging photometer (MIPS) on the Spitzer Space Telescope. The enhanced contrast image at the right shows the comet's outer shell and mysterious filaments of dust.

"We believe that a cavern full of ice, located as much as 100 meters beneath the crust of the comet's nucleus, underwent a change of phase," says Bill Reach of NASA's Spitzer Science Center at the California Institute of Technology. "Amorphous ice turned into crystalline ice" and, in the transition, released enough heat to cause Holmes to blow its top.

Anyone watching the sky in October 2007 will remember how the comet brightened a million-fold to naked-eye visibility. It looked more like a planet than a comet—strangely spherical and utterly lacking a tail. By November 2007, the expanding dust cloud was larger than Jupiter itself, and people were noticing it from brightly-lit cities.

Knowing that infrared telescopes are particularly sensitive to the warm glow of comet dust, Reach and colleague Jeremie Vaubaillon, also of Caltech, applied for observing time on the Spitzer Space Telescope—and they got it. "We used Spitzer to observe Comet Holmes in November and again in February and March 2008," says Reach.

The infrared glow of the expanding dust cloud told the investigators how much mass was involved and how fast the material was moving. "The energy of the blast was about 10^{14} joules and the total mass was of order 10^{10} kg." In other words, Holmes exploded like 24 kilotons of TNT and ejected 10 million metric tons of dust and gas into space.

These astonishing numbers are best explained by a subterranean cavern of phase-changing ice, Reach believes. "The mass and energy are in the right ballpark," he says, and it also explains why Comet Holmes is a "repeat exploder."

Another explosion was observed in 1892. It was a lesser blast than the 2007 event, but enough to attract the attention of American astronomer Edwin Holmes, who discovered the comet when it suddenly brightened. Two explosions (1892, 2007) would require two caverns. That's no problem because comets are notoriously porous and lumpy. In fact, there are probably more than two caverns, which would mean Comet Holmes is poised to explode again.

When?

"The astronomer who can answer that question will be famous!" laughs Vaubaillon.

"No one knows what triggered the phase change," says Reach. He speculates that maybe a cometquake sent seismic waves echoing through the comet's caverns, compressing the ice and changing its form. Or a meteoroid might have penetrated the comet's crust and set events in motion that way. "It's still a mystery."

But not as much as it used to be.

See more Spitzer images of comets and other heavenly objects at www.spitzer.caltech.edu. Kids and grownups can challenge their spatial reasoning powers by solving Spitzer infrared "Slyder" puzzles at http://spaceplace.nasa.gov/en/kids/spitzer/slyder.

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Article Submissions

The HAA welcomes your astronomy related writings for the Event Horizon newsletter. Please send your articles, big or small, to:

editor@amateurastronomy.org

The submission deadline is two weeks before each general meeting.

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