Volume 14, Issue 11

November 2007

HAMILTON AMATEUR ASTRONOMERS

Event Horizon

Comet Holmes

A Brilliant Gem in the Night Sky

Comet Holmes imaged by Mike Spicer

On the evening of October 25th, a dim comet that hardly anyone paid any attention to suddenly brightened dramatically by almost a million times. As the word spread around the Internet, astronomers, both professional and amateur turned their telescopes toward Perseus to see the newly brightened comet. From its previous magnitude 17, Comet Holmes is now a

(Continued on page 2)

From The Editor's Desk

November brings colder weather but it also brings us a treat in the form of a very bright comet—Comet 17P Holmes. This normally dim comet suddenly increased in brightness more than 1 million times on October 25th. Since that time it has been observed and photographed by members of our club. These observations have been assisted by several nights of very clear skies that have appeared just in time to give us a glimpse of this rare sight.

If you have not seen Comet Holmes… shame on you! All you need is a finder chart and your naked eyes. A pair of binoculars would be even better. Get out there and start observing!

Tim Philp, Editor

Inside this issue:

Calendars!

The HAA Council is trying to gauge interest in the publication of an HAA Astro-Calendar. If you would be willing to purchase a calendar, please let Mike Spicer know.
If there is enough interest, the club will produce them for sale for $18-$20.

Comet Holmes Lights up the Sky! - By Tim Philp (Continued from Front Page)

bright naked-eye star-like object that is very obvious, if you know where to look. In fact, if you use averted vision, you can start to make out the comet's distinctly non-stellar appearance.

When photographed, the comet takes on truly spectacular proportions. The coma of the comet is expanding every day but the comet shows no signs of dimming.

While the comet is impressive in binoculars, photographs such as the one on the cover, taken by club president Mike Spicer show the comet in all its glory. Some photographic estimates have put the size of the comet at fully 1/3 the angular diameter of the full moon!

Comet Holmes has been known for a long time. Discovered by English amateur astronomer and comet hunter, Edwin Holmes in the 1890's, it has been known to change its brightness dramatically in the past. In 1892, it reached 4th or 5th magnitude and then faded back to obscurity. Two and a half months later, the comet underwent a similar outburst.

Astronomers do not know why this comet suddenly became so bright, but the current theory is that something struck the comet hard enough to blow dust and ice from the comet's surface and create an expanding shell of dust.

Comet Holmes looks very much like a cross between a globular cluster and a planetary nebula. Through casual inspection, it looks spherical, but recent photographs have shown the existence of a tail.

Any tail that this comet exhibits will likely be short and stubby as the angle between the Earth and the sun is only about 15 degrees from the comet's perspective. That means that any tail will be almost invisible as seen from the Earth.

Comet Holmes is a beautiful object that will not be around long before it starts to fade. Get out those binoculars and start observing. Don't wait for the next comet!

Comet (17P) Holmes presents an appearance between a globular cluster and a planetary nebula. It is easily visible in binoculars and has gotten large enough to present a non-stellar appearance to the naked eye. **Photo Credit: Mike Spicer**

From the Chair — by Mike Spicer

At the HAA annual general meeting last month, members voted in a new Council for the coming year with not one dissenting vote. Let me tell you a little about our 2008 Council.

The previous Council had selected Harvey Garden, Tim Harpur, Gary Krevenky, Ann Tekatch and Steve Germann as this year's five Councillors-at-Large. Ann of course is a founding member of the club. She brings practicality and professional experience to Council. The others, though more recent additions to the club, are all very active observers with energy and ideas to contribute to Council. I look forward to working with them.

Darrell Maude as Secretary and Don Pullen as Treasurer are two signing officers of the club. Each brings professionalism and stick-to-itiveness to the Council and each has my complete confidence. Jim Wamsley is our club membership director, brimming with ideas, working to enlarge our membership base and keep membership information up-to-date. Jim has provided Council with a spacious, friendly meeting room in a central location. Members are welcome to attend Council meetings to observe or to present ideas – email;

Chair@amateurastronomy.org.

Prof. Greg Emery of Mohawk College is our club Observing Director this year, a position he has held in the past. Greg promises to ensure we have lots of eye-catching observing targets and may bring clear skies, too. Our club news, blog discussions and images will be suitably displayed at the club's web site,

www.amateurastronomy.org by our efficient webmaster, Bob Christmas. Greg and Bob bring their years of experience to Council again this year – watch for their presentations!

Tim Philp has agreed to continue as editor of our club newsletter the Event Horizon for another year. It's a thankless job that he does very well and is under-budget every month, putting out a beautiful and informative 16 – 20 page booklet with contributions from a number of members, including the famous Tech Tips written by Tim himself.

This year's Council is an even mixture of experienced old hands and enthusiastic new people. Every one of them is an active observer, imager or writer. Everyone will have ideas on making the club a place that welcomes and informs you. We look forward to celebrating our 15th anniversary next October with you and many new friends. Please let us know how we are doing, and consider contributing an article to the newsletter or a short talk at one of our meetings, to tell us what you have been up to. H.A.A. is a wonderful astronomy club!

October was a busy month for our active group of astronomers. On the 4th a dozen members met with a local cub scout group at Binbrook for a tour of the very clear evening sky. Another nine October evenings were clear enough for observing at members' homes or at Binbrook with warm weather for most of the month. We received and decided on the submissions for our 2008 H.A.A. 15th anniversary calendar. New equipment was purchased by several members and is being put to good use.

Mars now appears before midnight with a disk over 10" in diameter, and Saturn vies with Venus as a well-placed predawn observing target. The Orionid meteors were brilliantly white for several days in the morning sky and the Leonids are expected to be a hit in mid-November despite the Moon's presence. H.A.A. fielded two well-attended lunar grazing occultation expeditions in October, regrettably both clouded out. Comet 17P/Holmes reappeared in Perseus with an explosive outburst to magnitude 2 on the 24th and has been a beautiful sight well-placed for observing and imaging since then. Check the Reports button on our club web site for daily updates on these and other activities. H.A.A. is Hamilton's active astronomy club!

Adventures in Astrophotography—Story and Photos by Kerry-Ann Lecky Hepburn

My interest in astronomy started from a fairly young age. For as long as I can remember I have had a real fascination with the wonders of the universe and the countless number of objects in the night sky. Those objects varied between beautiful, intricate, and mysterious. After getting my first telescope at the age of 11 and then my first serious film camera as a teenager I began to think of the possibilities of astrophotography. Over the course of almost 15 years I dabbled in it, but it wasn't until the beginning of this year (2007) that I have made some huge leaps in the hobby. I became seriously hooked.

My first ever astro-photos started with my decision to do a high school science fair project on variable stars back in 1990. I figured that if I hooked up my Minolta SLR 35mm film camera to my 4.5 in Newtonian reflector with the help of a t-ring and t-adaptor, I could take a single second timed exposure of a variable star over the course of a few months. The varying diameter of the star on my photo could possibly show how it changed in brightness.

The planets and the moon were also fine targets for me to try. I thought that with planets I would have to take long exposures to capture them, but later found after getting my pictures back that that was not the case. I also realized that the planets moved too quickly for my 4 second long exposure, especially with no tracking on my rickety equatorial mount.

Again with the moon I varied the exposures but they were still overexposed since I had no formulas at hand giving me an idea of what times would be ideal. The photos were taken during a lunar eclipse.

During my York University years, I spent a half a year as a volunteer at the observatory. There I was able to take advantage of a fully computerized 30cm telescope. I only took photos on a couple of occasions by simply hooking up my trusty Minolta camera with my t-ring and the observatory's t-adaptor. I took my first successful astro-photos that I could say I was proud of for a very long time. Those shots were only single exposures. I guessed at exposure times while using cheap Blacks ISO1600 film.

Since I didn't have access to the observatory telescope whenever I wanted and my Newtonion telescope was no good for photographing objects other than the moon, I opted to start concentrating on photographing widef ield targets. With my camera and 50mm lens on a simple tripod, a 30 second exposure at a high ISO setting yielded fairly good results.

2007 was when the bug hit and I really wanted to try my hand at long exposure astrophotography through the telescope. I did a bit of research and found the best deal that I could find for an entry level motorized mount and a scope with reasonable amount of aperture that would be a nice upgrade to my 4.5 in Newtonian. I settled on the Celestron 6 in Schmidt Cassegrain telescope on the CG5-GT (ASGT) mount. This scope, combined with my Canon 300D digital SLR camera, would provide the stepping stone I needed to get into more serious astrophotography.

There was a bit of a learning curve to start because in order to get the GOTO features and tracking to

Adventures in Astrophotography (Continued)

work properly, I needed to learn about polar aligning. Once I got that figured out I started taking short exposure images of bright objects like the moon and Saturn.

Once I got the setup and alignment all figured out over several nights on my balcony. I took my scope out to Binbrook in April for my first observing session with the HAA. I always read that the best way to get into really long exposure photography was to piggyback your camera and lens on a mount that tracks. I then took images of Venus, Pleiades, and Orion's Belt. It turned out well and because I was using a wide angle lens I was able to get exposures up to 3 minutes without seeing star trails.

After a very short experience piggybacking, I felt the need to try those long exposures through the 6in SCT. However, because of the higher magnification and smaller field of view, I knew I would need very accurate tracking if I wanted to image objects that are faint. Having a motorized mount like the CG5-GT was great but not quite good enough. I would need a way of precisely guiding a single star so that the errors in the drive and tracking would not be noticed on the long exposure images. I did a lot of research online, reading the many pros and cons of various methods of guiding and finally came to the decision that the way to start would be to buy a second small scope (80mm) that I could mount side by side with the 6in SCT. So while my camera was hooked up to the 6in scope, a guiding eyepiece called a reticle eyepiece with illuminated cross-hairs would then be used with the 80mm scope to ensure that a star in the field of view stayed on or near the cross-hairs. The hand controller would be used to slew the mount in which ever direction needed to accomplish this. After practicing this for some time, keeping in mind some tips that Tim Harper gave me, I was able to take a few long exposures of one of my favourite galaxies M51. After taking a few long exposures and loading them onto the computer, it occurred to me that I would be faced with another difficult feat.... image processing. Knowing that the more images you take the more you can increase the signal to noise ratio, I manually stacked the images in Photoshop and then made a few adjustments to the levels and saturation and voila....

I was really proud of the fact that it actually looked better than what I saw in the eyepiece and my husband was amazed that I was able to capture such an object from home. That was enough to keep me going.

Into the early summer, I continued to practice this method. I even tried imaging with the 80mm telescope on large target while using the reticle eyepiece in the 6in scope for guiding. The results looked much sharper. The images from the 80mm's larger field of view, did not show as much error from my manual guiding because the field of view was much larger than the 6in. I also started to take dark and flat frames to help minimize noise and vingetting. In addition I improved my processing by finding a free program on the net that easily stacked all those frames in a way that gave me a drastically cleaner looking final image.

Although there is a great deal of satisfaction with manually guiding, I found it very tedious. After several minutes staring at a faint star in the eyepiece with the fingers practically pasted onto the hand controller, I eventually got cramps in my neck,

Adventures in Astrophotography (Continued)

leg and back. I also love observing and felt I was missing out by spending all my time staring at this one star. I began to consider the auto-guiding route. I did a bit of research and realized that all I would need is a cheap webcam or imager. I already lug my laptop with me into the field so why not lug around one more item plus a few more cables? I talked to Mike Spicer and he recommended the Deep Sky Imager (DSI) because of its sensitivity to fainter stars. I bought it from him for a good price and immediately began to work on reconfiguring my astrophotography setup.

I had to first get my CG5-GT mount to communicate with my laptop via the RS232 cable and ASCOM platform (many astro programs require ASCOM in order to communicate with the ASGT mount). I then loaded a freeware program called PHD Guiding which was able to communicate with the DSI and my mount. A few clicks of the mouse a bit of DSI focusing on a single star and a few more clicks and I was on my way. I was surprised at how easy auto-guiding was to get running after getting the initial communication bugs worked out.

I was pretty happy with my images but still thought it could improve. I wanted crisp stars, and a smooth dark background with more faint features making it through the final image. I kept getting tips from fellow astro-photographers online, saying that I need take many more frames (subs) for stacking. Before auto-guiding this would have been an impossible task for me, but since I could get my computer to do much of the work in terms of timing exposures and guiding I felt like it was definitely possible. The results were astounding to me when I was able to combine the accuracy with auto-guiding and the improvement in signal to noise ratio from taking 15+ frames which were a few minutes in length each.

Image collecting is only half the battle when it comes to astrophotography. The other battle is image processing. Sometimes I actually find it takes way more effort and time processing an image than it does to setting up your telescope and collecting the frames. I did some research online to try to improve on my processing, but I didn't notice a huge change until I went to an image processing seminar at Starfest. I learned how to better use layers, levels, curves, and saturation in a way that brought out even more detail and colour.

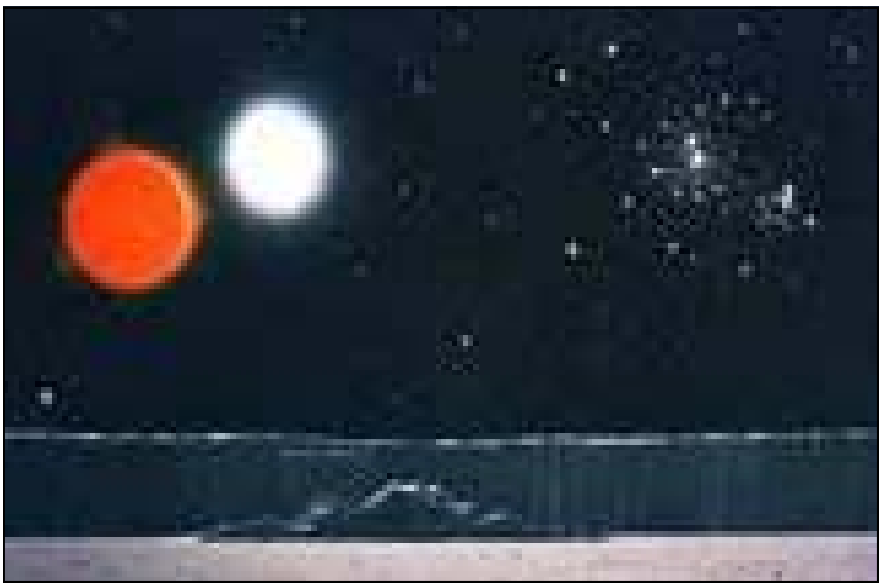
I have also learned online about stacking several sessions of images to make one master image that can have a total of several hours of exposure times. This can make a phenomenal difference.

Prior to this Fall, most of my astrophotos were taken with the Canon 300D. It proved itself to be a very capable camera for daytime and nighttime photography, but with so much time and energy being spent on this hobby of photography it made sense to finally upgrade when I found out that Canon had come out with the new 40D. With the live-preview screen I am now able to get focused much faster and easier. The higher resolution, lower noise, absence of ampglow, and increased image transfer speed have really added another level of ease and improvement.

So now I am nearing the end of a great year of astrophotography. I have learned that it takes a great deal of patience, research and dedication to accomplish this task. The joy of seeing a beautiful night sky object appear before your eyes during the image collection process and then after the processing process is so incredibly satisfying that it keeps you coming back. I feel I can now say that am well into my journey to capture the wonders of the night sky.

Double Star Planets—by Tim Philp

When we think about space travel to other stars, our ideas are often formed by science fiction. As the Enterprise or other starship approaches a planet, you can be sure that there will be a sun in the sky. It is surprising to note, however, that astronomers have learned that better than half of all stars are not alone. They have a companion star. Double stars, or binary systems are quite common. There are many stars that we have observed that have companions that orbit each other or a common centre of gravity.



These stars can be very similar in size, age, and composition, or they can vary wildly. Giant stars sometimes have dwarf companions and the colours of stars can be quite different and often quite beautiful.

Many stars are multiple stars. Polaris, the North Star is a trinary star system, but it requires a good telescope to actually split the larger pair. The third star in the system cannot be seen in a telescope. Sirius, the brightest star in the sky, near the constellation of Orion, is a binary star. In fact, Alpha Centari, the closest star to our sun is also a triple star system.

It has only been recently that we have turned our minds to planets outside of our solar system. The reason for that is that we have not had the technology to actually image planets around other stars. They must be observed indirectly.

Planets are small, dim objects orbiting large bright stars and it is almost impossible to split the two of them. It would be like trying to image a firefly next to arc-light at a distance of 50 kilometres! Not a simple task, however, by observing the effects of these planets on their stars such as making the star wobble or dimming the star as the planet passes in front of the star, they can be detected. Easier to detect are debris disks that surround stars that either have planets or are in the process of forming planets.

But what would it be like to be on a planet that had two (or more!) suns in the sky?

Of the 200 or so extra-solar planets discovered so far, about 50 of them orbit binary stars that orbit each other about 1000 times farther apart that the Earth is from the sun. However, it was always considered a theoretical possibility that other binary stars could have planets if certain special conditions were observed. We now have observations that indicate that planets around binary star systems are not only possible, but actually quite common.

First, the stars must be either very close together or else very far apart. The idea is that two stars could form close together and the debris disk that forms the planets would orbit both stars. Such stars would be separated by less than 50 times the Earth/sun distance.

The other possibility is that the stars are so far apart that they are almost independent stars. This would allow each star to have its own retinue of planets without interference from the other star. These planets have been detected by special observations by space and ground-based telescopes.

When astronomers turned their instruments toward such tightly coupled binary stars, they found that about 60% of them had debris disks orbiting them that could form planets. That seems to indicate that tight binary systems are more likely to form planets than even single stars where the frequency of debris disks is less than 40%.

Binary star systems where the stars orbit at an intermediate distance such as that between our sun and the planet Jupiter, are too close to form debris disks without disruption from the stars gravitational fields, nor are they far enough apart to have independent debris disks.

If a planet orbits a binary star system, the views of the sky could be spectacular. Of course, it would make constructing a calendar or figuring out how the planets work very much more difficult for any inhabitants of such worlds.

Perhaps we are most fortunate that we live in a relatively quiet section of the galaxy where nothing much happens and we only have one sun in the sky.

Tech Tips: Tap the Tube!—by Tim Philp

Our eyes are not very good for astronomy. They have tremendous chromatic aberration, and suffer from a myriad of other optical defects that would make them useless for astronomical purposes.

Fortunately, they are wired up to a couple of kilos of grey matter that processes the image that we see. This is somewhat akin to your raw astrophotographs versus your stacked and processed pictures.

Our brains were evolved to process visual information from the standpoint of a predator. We are designed to find our prey visually and move in for the kill. The evolutionary pressure that produced this behavour is very simple—we caught and killed our supper or we starved.

Unfortunately, our image processing was not designed for looking through a telescope for faint fuzzies. They were designed to find living prey.

One of the characteristics of our predator brain is that we are not so good at detecting faint, low contrast objects under low-light conditions, but we are excellent at picking out movement.

When we are looking through a telescope, our 'prey', a dim planetary nebula for instance, just sits there, unmoving, and sometimes undetected.

In order to make the dim object stand out, we can make use of our predator brain by fooling it into detecting dinner.

While you are standing at the telescope and you are having trouble finding a faint object, just give the telescope tube a very slight tap.

Unless you are using a 25 tonne telescope, the image will shiver in the eyepiece. This motion will trigger the predator in your brain to detect movement of the dimmest of objects.

It is amazing how an object will just jump out at you if the telescope tube is tapped slightly.

Good Hunting!

The Sky this Month—by Greg Emory

The crisp November nights can bring wonderfully clear skies as well as the ability to have a full viewing session and still get to bed before the alarm goes off in the morning. The traditional "summer" constellations of the northern hemisphere are dipping to the west while the "winter" constellations are rising from the east.

The centerfold star map is set for the Binbrook Conservation Area at 20:00 h EST. The Milky Way will stretch from East to West across the sky. The "Water", or collection of water themed constellations is prominent on or to the east of the meridian. The water is made from the constellations Pisces, Aquarius and Cetus.

Directly overhead of the northern observer is the striking feature of the constellation Pegasus. The Great Square of Pegasus is a very large feature and easily recognizable to even the newest of observers. Sprouting forth from the northeastern corner of the Great Square of Pegasus is the constellation Andromeda.

Andromeda is the beautiful Princess chained to the rock awaiting rescue from her hero aboard his winged horse, Pegasus. The constellation Andromeda holds the "Great Andromeda Nebula". It has been known for some 70+ years that the great nebula is not a nebula but is actually a large spiral galaxy that is similar in size to our own Milky Way. The realization was part of a critical step in the development of the model of the universe. (Someone should really do something to honour the pioneering breakthrough this represents – like name a satellite or a telescope after the guy – hey or maybe a telescope that is a satellite – naw if we try that someone will probably just screw up the mirror on it anyway.) The Andromeda Galaxy, M31 on the Messier list, is one of the targets in astronomy that is naked eye visible and provides a better view in wider field of view instruments. It is a beautiful target for the beginning observer.

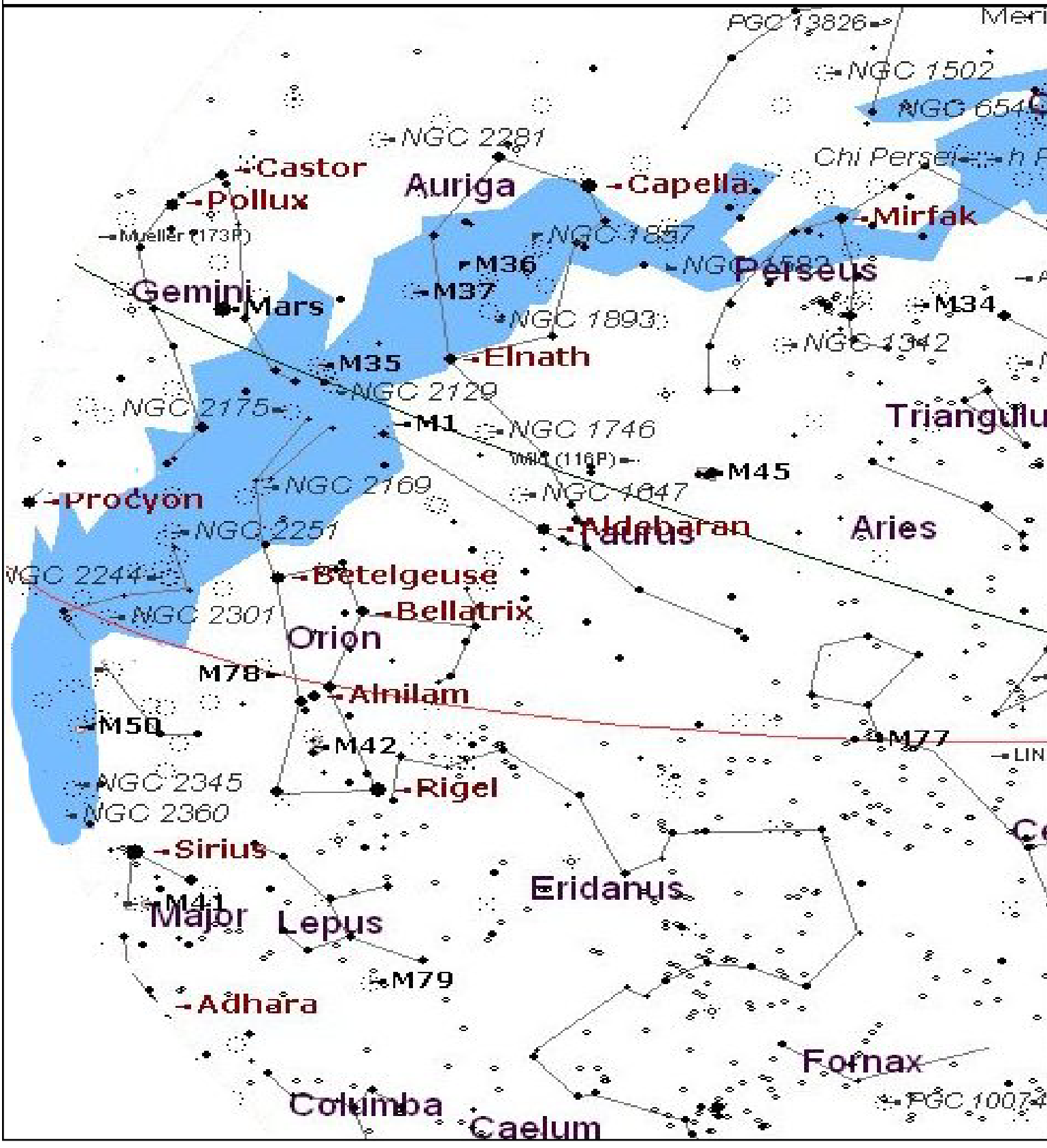
My first true observing session (with the HAA August 11, 2001) had me standing with members of the HAA learning how to find something with binoculars by a method called star hoping. Later on a new friend showed me the view through her telescope of the same object. The object was M31, and like Victor Kiam I liked the telescope so much I eventually bought it.

Other deep sky targets in good viewing position (near the meridian) include M33, a face on spiral galaxy in Triangulum. A globular cluster in Pegasus, M15, is a nice view in all amateur equipment. The portion of the Milky Way near the meridian contains beautiful open clusters around the constellations Lacerta and Cepheus. This region is rich in stars and clusters and offers wonderful sights for just panning or scanning. Just move your telescope or binoculars along the Milky Way and see what is there.

The planets for the month of November are detailed in the table on page 12. Mars is approaching the optimal viewing for the next 19 months and is situated relatively well in the sky in terms of elevation. Saturn rises later in the night (technically it is early in the morning), but when it is clear with stable skies the view will never disappoint.

(Continued on Page 12)

The Sky T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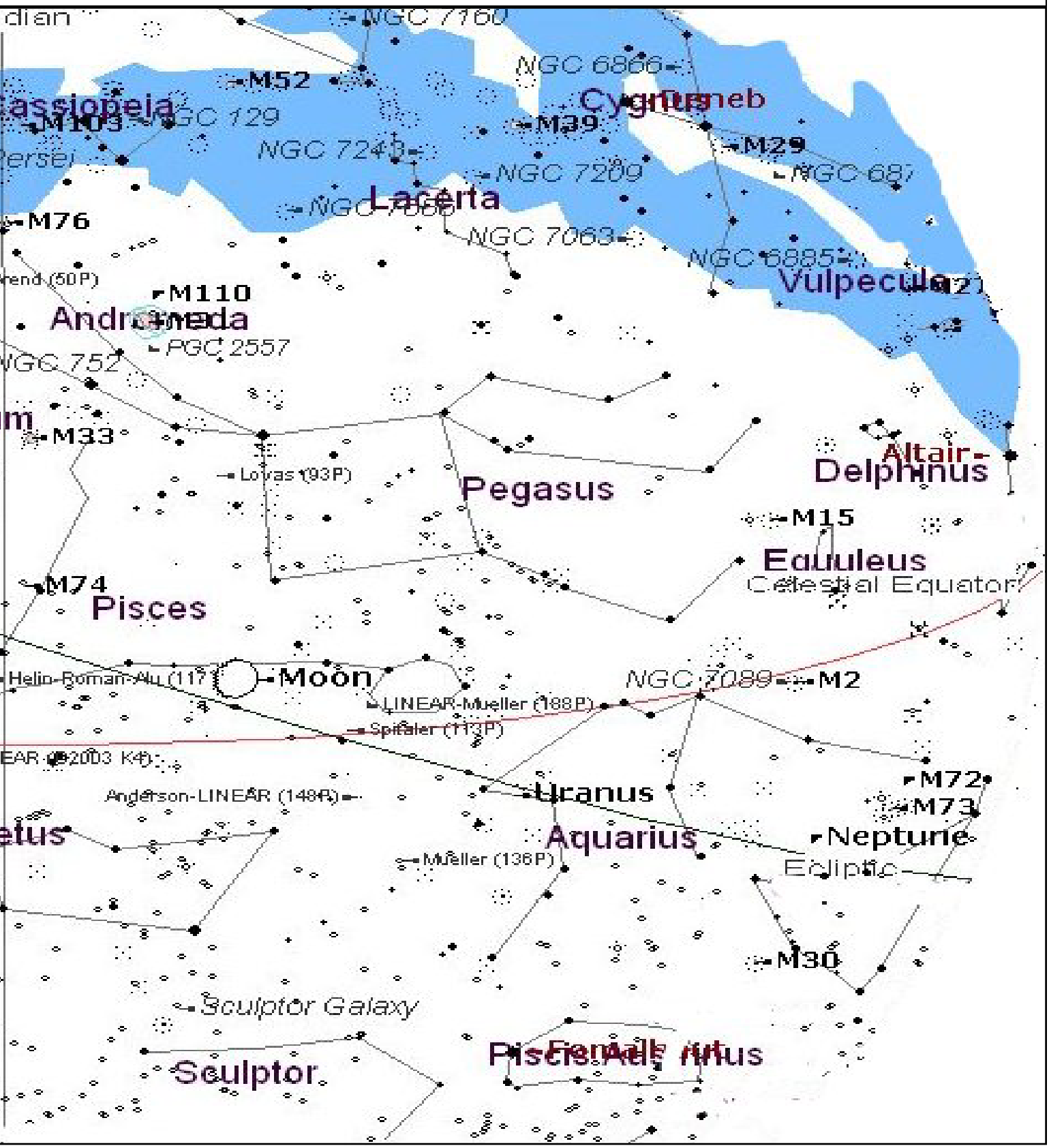
his Month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Celestial Equator
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Pisces
Moon
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M2
LINEAR-Mueller (188P)
Spitaler (111P)
Anderson-LINEAR (148P)
Uranus
M72
M73
Aquarius
Neptune
Mueller (136P)
Ecliptic
M30
Sculptor Galaxy
Sculptor

Sky this Month (continued)– by Greg Emory

Planet	Rise	Magni-tude	Size	RA	DEC
	(hhmm)			(hhmm)	(degrees)
Mercury	5:27	-0.7	6.3”	13h54m	-9° 21’
Venus	3:25	-3.6	21.1”	12h11m	7’29”
Mars	20:11	-.8	13.2”	6h53m	24°17’
Jupiter	10:23				
Saturn	0:56	0.9	17.5”	10h34m	10°15
Uranus	14:27	5.8	3.5”	23h04m	06°45'
Neptune	13:23	7.9	2.4”	21h26m	15°20'

The moon is new on November 9 , is in first quarter (magnitude -10) late on the 17th of the month and is full on the 24th. The last day of the month finds the moon 61% illuminated with a magnitude of -10.5.

Weather not withstanding, optimal viewing of deep sky objects is from the start of the month until roughly the 18th. Planetary viewing is best, in general for “morning planets” in the early part of the month. Planets in good viewing position in the evening will suffer little obscuring from the moon later in the month when the moon rises in the early morning.

Tech Tips: Centre Spot Your Mirror—by Tim Philp

All telescopes must be collimated to give the best performance. Collimation consists of aligning all of the components of your telescope along a common optical axis.

Due to their design, Newtonian and Dobsonian telescopes require more frequent collimation than other, more robust designs and thus need more frequent collimation.

One of the most difficult things to do is to get your primary mirror and your secondary mirror into proper alignment. To do this, it is important to know exactly where the centre of the primary mirror is located.

While you can ‘eyeball’ it, a better way is to mark the exact centre of your mirror with a spot that will give you assurance that you have hit the mark.

Some people us a felt tip marker to indicate the exact centre of the primary mirror, however, a better way is to use a reinforcing ring that you can get at a stationary store. These rings are used to reinforce paper in binders to keep them from tearing out easily.

Just place the ring in the centre of the mirror and voila! Instant centreing guide. Don’t worry about covering up the mirror; the centre of the mirror never sees starlight because of the central obstruction.

Almost Discovered!—by Tim Philp

When you look at the sky over a long period of time, it becomes clear that there are objects in the sky that move independently from the fixed stars in the sky. The ancient Greeks called these objects planets which means wanderer. And wander they did.

The ancients knew of 5 planets – all bright objects that can be clearly seen with the naked eye. Mercury, the most elusive of the planets never strays too far from the sun. Brilliant Venus wanders farther and shines as a bright morning or evening star.

Blood red Mars gets brighter or dimmer depending upon how far it is from the Earth. Giant Jupiter shines brightly as it moves slowly across the sky and ringed Saturn complete the five.

There is another planet that is visible to the naked eye from a dark-sky site, but it was completely unknown in ancient times. Uranus, named after the Greek deity of the heavens was not officially discovered until March 13, 1781 when it was seen by William Herschel (1738 – 1822). Interestingly, the planet had been seen many times before, but it was not recognized as a planet, but confused with a star.

The first recorded observation of Uranus was by Galileo who was recording the positions of the moons of Jupiter with his crude telescope. One of his dated diagrams shows a star in a position where no star exists. Calculating the orbit of Uranus, it is easily discovered that Galileo saw Uranus but failed to recognize it as a planet.

Another astronomer flirted with fame when he recorded Uranus as a star. John Flamsteed, the English Astronomer Royal saw the planet in 1690, but thought he was looking at the star 34 Tauri. The discovery of Uranus had to wait for better telescopes than Galileo or Flamsteed had.

Working from his home in Bath England, Herschel made the discovery that made him famous. It allowed him to take up astronomy full-time when he got a pension from King George III. Herschel named the planet *Georgium Sidus*, Latin for "George's Star", in honour of the king; a factor that probably got him his pension.

The name did not stick, however, as the French called the newly discovered planet Herschel. Eventually, the planet received the name by which we know it today – Uranus. This name was chosen to keep the naming of planets consistent with the mythological names of the other planets. The name Uranus did not come into general use until 1850.

The planet itself is a giant ball of very cold rock and ice. It is more than 51,000 kilometres in diameter and orbits the sun more than 19 times farther away than does the Earth. It is the seventh planet from the sun and the third largest in diameter.

Uranus has two features that make it interesting. First, like the Earth, the planet is tipped with respect to its orbit. While the Earth is tilted at 23.5 degrees, Uranus is laying completely on its side with a tilt of about 90 degrees! These tilts of rotational orientation give the planets their seasons.

Unlike the other giant planets, Uranus seems to be composed of rock and ice more or less evenly distributed throughout the planet. It has a tremendous atmosphere of mostly hydrogen, helium and methane.

The other feature of Uranus that is interesting is that, like Saturn, Uranus has a system of rings. Unlike Saturn, these rings are very faint and were only discovered when we sent a spacecraft out there to photograph the planet. Uranus has 11 rings composed of large house-sized chunks of rock along with a sprinkling of dust.

Until the Voyager 2 spacecraft visited Uranus, we knew of 5 moons. We now are aware of 27 moons and there are probably more hidden in the ring system.

Uranus is a beautiful blue colour that is easily visible in a small telescope. This blue is caused by the absorption of red light in the methane atmosphere. It is theorized that there may be banded weather systems such as we see on other planets like Jupiter and Saturn, but the methane layer hides the details from us.

Uranus is the first planet discovered in modern times. It gave fame and fortune to its discoverer and was the start of learning about just how large and varied our solar family can be. Modern-day Herschels are busy scanning the sky for objects much smaller than Uranus. Who knows what discoveries are waiting out there for us if we only look.

Mars, Coming Soon to a Sky Near You—by Tim Philp

Mars, the seventh largest planet, and the fourth planet out from the sun has been known since ancient times. Its name comes from the Roman god of war and the association probably came from the deep red colour of the planet resembling the blood spilt in human conflict.

It has been a favourite topic for science fiction writers who used the planet for numerous alien invasions of the earth. This was fueled by the 'discovery' by, Giovanni Virginio Schiaparelli (1835-1910), of markings on the surface of Mars.

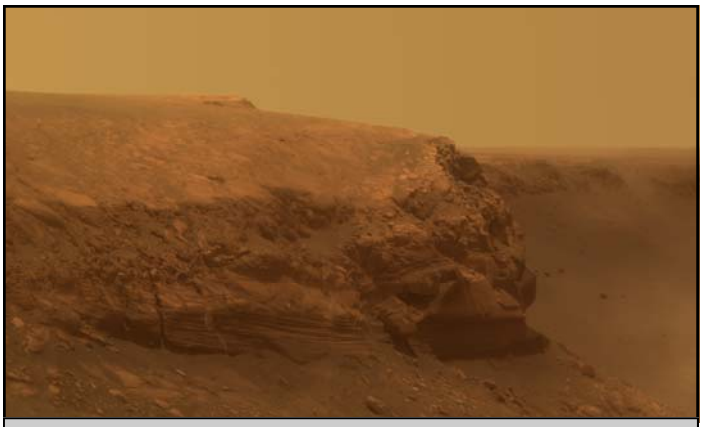
He called these markings 'canali', which means 'channels'. However, the Italian word was mistranslated into English as 'canals'.

Surveillance of the surface of Mars by orbiting satellites have failed to show these markings on the planet, but the association of Mars as an inhabited planet with an alien civilization struggling to survive the planet's depleting resources has persisted for years .

Mars is smaller than the earth at a diameter of only 6,794 km. Because it has no oceans, the land area on Mars is roughly equivalent to the land area on the earth. Mars orbits about 1.5 times further out from the sun than the earth so Mars is a cold world. Not too cold, however, for the possibility of life existing there.

The average temperature on Mars is about –55 degrees Celsius but it can swing widely from –133 degrees Celsius at the winter pole to a very warm 27 degrees Celsius during the day in the summer!

Mars is a geographers dream with some of the most varied terrain in the solar system. Some of the more spectacular features include; Olympus Mons, the largest mountain in the solar system at 24 kms; Tharsis, a 10 km bulge more than 4000 kms across; Hellas Planitia, a six km deep impact crater; and Valles Marineris a 4,000 km long system of canyons that are more than 7 kms deep. Valles Marineris makes the Grand Canyon on the earth look like a ditch!



A promontory nicknamed "Cape Verde" can be seen jutting out from the walls of Victoria Crater in this approximate picture taken by the panoramic camera on NASA's Mars Exploration Rover Opportunity.

Mars shows clear evidence of erosion that resembles similar features on the earth that were eroded by water. Most recently NASA's Mars Global Surveyor has returned pictures that show surface details down to the size of a small truck. These features suggest that Mars may indeed have liquid water even today. If so, this is good news for those who wish to colonize Mars.

There is evidence that Mars may have resembled the earth during an earlier time. Like the earth, most of the carbon dioxide was taken up by the planet to form carbonate rocks. Unlike the earth, however, Mars lacks volcanic activity that would recycle this carbon dioxide to give a significant greenhouse effect. Mars is therefore much colder than the earth would be at that distance.

Most of the atmosphere of Mars is carbon dioxide with a few traces of nitrogen, argon, oxygen, and water vapour. The atmospheric pressure is less than 1% of earth's atmospheric pressure; almost a vacuum.

There is enough of an atmosphere, however, to support winds that cause great dust storms that sometimes obscure the surface of the entire planet.

Mars also has permanent ice caps at both poles that are composed of carbon dioxide - what we call dry ice and possibly water ice too. These ice sheets expand and contract with the seasons as Mars revolves around the sun every 686.98 days, almost two earth years.

Mars also possesses two moons, Phobos and Deimos. These small moons are almost too small to be called moons. Phobos is only 11 kms in diameter and Deimos a mere 6 kms. Phobos is orbiting so close to the surface that it cannot be seen from all points on the surface.

Phobos is doomed. In about 50 million years it will either crash into the surface or, more likely, tidal forces will break Phobos into pieces forming a ring similar to the one that orbits Saturn.

Mars is an interesting planet that was just a bit too small to have followed the same geologic and biologic history as the earth. It does, however make a spectacular display in the night sky. This winter is our best look at the planet for the next two years. Make the most of it!

Member of the Month— Kerry-Ann Lecky-Hepburn— by Don Pullen

While she has only been a member of the HAA for less than a year, Kerry-Ann Lecky Hepburn has had a life-long interest in astronomy, photography and the weather. Barely having completed her first solar cycle, she was introduced to astronomy with a first-edition of NightWatch (which she still has - dog-eared and battered, but still frequently used) and a 4.5" Newtonian.

After finally getting settled down with her family and career, Kerry has finally begun to find time to return to her passions of photography and astronomy. While she was reintroducing herself to astronomy, she became aware of the astronomy clubs in the area including the HAA. Kerry eventually choose our club over the others because we were clearly the most active group. Since then she has become one of our most frequent observers at Binbrook, regularly attending most of our club's public events and supporting the HAA in many ways. And when she can't get out to Binbrook, she often sets up in her yard on the escarpment overlooking Grimsby and enjoy her dark skies from home. Since joining our club, her equipment collection has grown from her humble, but effective Newtonian, to include a Schmidt-Cassegrain, a small apo and a pair of 15x70 binoculars. Having visited the Mullers a few times to try their scope at home and at Binbrook, Kerry's gotten the DOB bug and is now considering a 12" scope to help pull in those faint fuzzies.

An avid photographer, you can see many of her images on the HAA blogs and on her own website;

www.weatherandsky.com. She has recently upgraded her well used Canon 300D to a brand new Canon 40D and is now capturing even more amazing images. With her fine eye, attention to detail and voracious appetite to learn, her skills will continue to grow rapidly. She is serious about her interests and doesn't act impulsively. You'll often find her researching a wide variety of topics related to astronomy, weather and photography. She's been known to frequent Cloudy-Nights for the latest reviews on any equipment and exchange ideas on how to improve her observing skills.

She has her amateur radio license and can sometimes be heard on the 440 MHz band. Kerry also participates in CanWarn which ties watching and reporting on severe weather conditions through the ham radio community to emergency services. Her husband Bill is also an avid radio fan. One of his passions is to track atmospheric conditions relating to their affect on long distance (DX) radio communications. The sun and weather can greatly affect how far certain radio signals can be sent, so monitoring weather and solar activity with a special fondness for auroras, is an important part of his hobby. While both sharing an interest in astronomy, they've managed to enjoy different aspects of this great pastime. In addition, the two of them run a weather station at their home which provides information to Environment Canada where Bill works. And since Kerry is a professional meteorologist with The Weather Network, she sometimes also references the station to help with her forecasts. Our "weather chick" often supplements (and occasionally contradicts) the CSC to provide more accurate information about the weather for many of our observing sessions and public events. While rarely wrong, she fortunately has a thick skin to deal with the teasing abuse that weather forecasters must always endure.

In recognition of this busy and accomplished young lady, who has become a very welcome addition to our club, I'm pleased to name Kerry-Ann Lecky Hepburn as November's Member of the Month.

Light Pollution—by Tim Philp

It almost seems that every time you open up your newspaper you are seeing stories of how man is destroying the planet. Air pollution, water pollution, global warming all jump out at you from the headlines. These are all serious problems that deserve our attention. However, there is something else that we are doing to our planet that could be easily fixed. We are losing our night skies.

Now this problem is not in the same league as air and water pollution, but it is something that is important. Since the invention of the electric light, we have been slowly increasing the amount of light that we use and our night sky views have deteriorated significantly.

There are many people today who have never seen a clear dark sky, never seen the Milky Way, and only have a vague idea that there are stars in the sky. Thirty years ago, I could stand in my backyard and see the Andromeda Galaxy with my naked eye. Today you are hard pressed to see stars of the third magnitude within the city limits.

Our cities are covered with butterscotch coloured domes of light that are a byproduct of our wasteful practice of scattering light into the sky where it is not needed. This practice adds to air pollution and to global warming because we burn fossil fuels to generate electricity.

We have come to believe that we need lots of light in order to keep us safe. While this may be true, most of today's light fixtures that we use to light the exterior of our homes and businesses are not designed to use the light that they generate to best advantage. Much of the light is wasted by directing it into the sky where it adds to light pollution and wastes precious energy.

In Brantford, where I live, we have examples of good and bad lighting practices. For instance, the lights on some of our streets have antique fixtures that resemble old time gas lighting. There are large globes on the top of poles that spread light not only on the ground where it is needed, but scatter light into the sky. This is wasted energy.

The same scene during and after the great blackout in Toronto. Light pollution is a serious problem to astronomers and anyone who wants to connect to the heavens.

On the other hand, the lighting in the parking lot of the Brantford Tourism Centre, where the HAA has had public observing nights, are full-cutoff lights that direct the light toward the ground where it is needed and useful instead of wasting it on the sky.

There are no villains here. Nobody deliberately sets out to waste energy and destroy the view of the night sky. It is just that there is no thought put into the best way to light our cities. This could be changed if our municipalities adopted stringent light pollution standards that prohibited light fixtures that direct light toward the sky.

Now, nobody is suggesting that every home owner should be required to replace poorly designed light fixtures at great expense, but certainly the sale of these kinds of fixtures should be banned. As well, municipalities should be required to install full-cutoff lighting in all new installations and replace older lighting standards with newer fixtures when they need replacement.

This would not fix the problem of light pollution overnight, but it would certainly prevent the problem from getting worse. Gradually, as streetlights were replaced by more efficient full-cutoff lighting, the problem would resolve itself in the future.

The incentive to do this is that well-designed lights cost no more to manufacture than poorly-designed ones. As an added benefit, full-cutoff lighting costs less to operate because it only puts light were it is useful rather than wasting it in the sky.

It sounds like a win for everyone. We get darker skies with which to admire the heavens, and we save money to boot!

While this is not a problem that sounds too serious on the scale of human problems, it is something that we can do to ease the burden on the planet and save money and energy in the process. We owe this to our children and grandchildren to allow them a clear view of the universe.

BOOK REVIEW Deep Sky Companions– Hidden Treasures—by Mike Spicer

Steve O'Meara holds a BSc and for many years contributed to Sky & Telescope Magazine. After the passing success of his earlier books, The Messier Objects and The Caldwell Objects, Steve O'Meara decided to take a page from Patrick Moore and make up his own list to popularize deep space objects he likes.

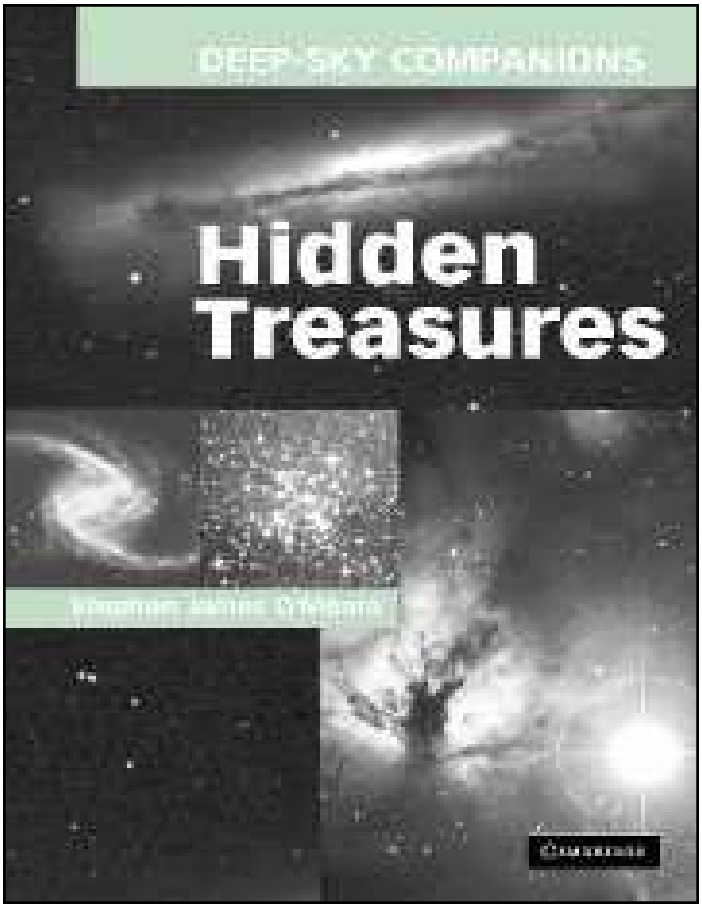
Observing with his little refractor telescope from Hawaii's best elevation with pencil and paper to draw what he can see in the ethereal darkness, Steve likes a lot of things in the sky that aren't Messier or Caldwell objects.

Object Type	Messier	Caldwell	O'Meara
Open Clusters	27	28	38
Galaxies	39	35	35
Globular Clusters	28	18	8
Bright Nebulae	7	12	8
Planetary Nebulae	4	13	14
Absorption Nebulae	0	1	1
Supernova Remnants	1	2	0
High Proper Motion	0	0	1
Asterisms	1	0	4

Steve's book can't be used at the telescope because at 602 pages printed on magazine style paper it weighs a ton, does not open flat and has tiny print, much like his earlier books that can't be used at the telescope to find Messier or Caldwell objects. Purchasers of the earlier books were scathingly critical of the tiny b/w images and miniscule finder charts he used, and just like a journalist he ignored the criticism to include the same kind of tiny b/w images and small, mostly unhelpful finder charts in this book, too.

A number of the objects are not visible from Canada at all, being in the far Southern Hemisphere. Fortunately, some of his objects aren't hidden at all - they easy to locate. Hidden Treasure #34 is the Flame Nebula, located right beside second magnitude Alnitak (Zeta Orionis).

O'Meara describes it as "a pale, sepulchral glow"



and while I have not visited many burial caves, I don't think any of them glow so his description isn't too helpful. Steve doesn't just describe the Flame, he explains what one might see if the dust were cleared away and a huge telescope used to see what we obviously can't. Oddly, he doesn't put in a colour photo of what we can see, such as one of Tim Harpur's excellent images. He does talk about a lot of the objects located near the Flame Nebula much as he does the other objects he selects in this book - about 6 pages of small type for each object.

When I observe, I like to go with a list of things to see that is handy to the scope. This book isn't useful for that. I like to research objects with a book that has a good finder chart, a few good images and a brief description. Steve's book doesn't fit the bill there, either. It's more a book that sits on the shelf well. You can visit me and see it there.

Messier's Catalogue is world-famous. The Caldwell Object Catalogue hasn't caught on well. I predict that O'Meara's Catalogue won't bring him even as much

The Event Horizon Archives— Catch a Falling Star in your Binoculars By Anne Tekatch—December 1996

A fellow member of the American Association of Variable Star Observers (A.A.V.S.O.) posted a list on the AAVSO discussion group recently of variable stars visible in binoculars . I was surprised to count 139 visible to northern hemisphere observers!

Most people are unaware of how many variable stars there are, but I was shocked to learn that so many were bright enough to follow with only the aid of a pair of binoculars. The list posted on the Internet discussion group was prompted by complaints from many observers that they lacked the time and energy needed to set up telescopes and do variable star estimates on a regular basis. (A problem many of us have!) Someone pointed out how quickly and easily brightness estimates could be done with binoculars and a list of suitable stars was then compiled and posted. I've reviewed the list and narrowed it down to just the brightest stars - those that would be visible (at this time of year) throughout their change in brightness from the light polluted skies of Southern Ontario. I have listed them in order of right ascension:

Designation	Name	Type	Brightness Range
0022+17	TV Psc	Semi-regular	4.7 - 5.4
0050+60	gamma Cas	GCas	1.6 - 3.0
0146+67	NSV650 Cas	L	6.9 - 7.7
0214-03	Mira (o Cet)	Mira	2.0 - 10.1
0258+38	rho Per	Semi-regular	3.3 - 4.0
0343+23	BU Tau	GCas	4.8 - 5.5
0349+30	X Per	GCas	6.0 - 7.0
0506-11	RX Lep	Semi-regular	5.0 - 7.4
0549+07	Betelgeuse	Semi-regular	0.0 - 1.3
0608+22	eta Gem	Semi-regular	3.2 - 3.9
0617+49	psi Aur	L	4.8 - 5.7
0619+07	T Mon	Delta Cephei	5.6 - 6.6
2139+09	epsilon Peg	L	0.7 - 3.5
2140+58	mu Cep	Semi-regular	3.4 - 5.1
2225+57	delta Cep	Delta Cephei	3.5 - 4.4
2349+56	rho Cas	Semi-regular	4.1 - 6.2

Designation: The first four digits are right ascension (hours/minutes), second two digits preceded by +\- show declination.

Name: Where possible, I have shown the star's popular name. Otherwise, standard Bayer nomenclature or variable star designation is shown. (If you're new to this, the second part of the name is an abbreviation of the constellation in which the star is found. Most good star atlases (including Star Atlas 2000) label the stars with their Bayer (Greek alphabet), Flamsteed (numbers) and variable star (one or two capital letters) designations.) The star called NSV650 Cas is a suspected variable star, it awaits enough data to confirm its type, period and light curve.

Type: The class of variable star: Mira stars are long period variables, taking a year or so to go through a complete period of brightness change; semi-regular stars show some predictability in their light curves, but occasionally display an unexpected change in brightness; Delta Cep (or Cepheids) stars change brightness over a relatively short period of time (days); L stars (RR Lyrae stars) are slow irregular stars; GCas (gamma Cas) stars change little in brightness and take generally 50 to *several hundred* days to go through their period.

Range: this is the usual range in brightness for the star, from brightest to dimmest. The less the difference between brightest and dimmest, the more difficult it is to detect a change.

To follow the brightness of a variable star, you need to compare that star to nearby ones of known (and unchanging) brightness. I can print comparison charts for any of the stars listed here for anyone interested. If you'd like a chart, give me a call.

I would like to point out that the famous long period variable, Mira, will be reaching its maximum brightness on February 10/97. Now would be a good time to start following it in binoculars.

Cassini on the Trail of a Runaway Mystery—NASA/JPL Press Release

Don't let Mars's cold, quiet demeanor fool you. For much of its history, the Red Planet has been a fiery world.

Dozens of volcanoes that dot the planet's surface stand as monuments to the eruptions that once reddened Mars's skies with plumes of glowing lava. But the planet has settled down in its old age, and these volcanoes have been dormant for hundreds of millions of years.

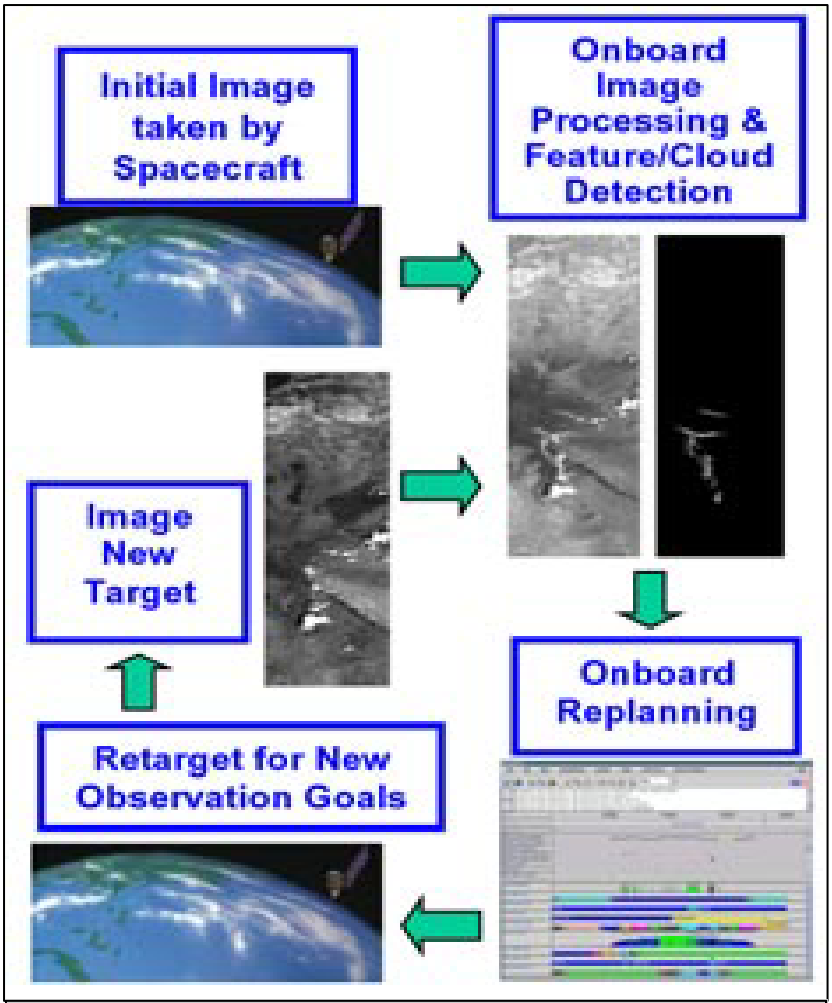
Or have they? Some evidence indicates that lava may have flowed on Mars much more recently. Images of the Martian surface taken by orbiting probes show regions of solidified lava with surprisingly few impact craters, suggesting that the volcanic rock is perhaps only a million years old.

If so, could molten lava still occasionally flow on the surface of Mars today?

With the help of some artificial intelligence software, a heat-sensing instrument currently orbiting Mars aboard NASA's Mars Odyssey spacecraft could be just the tool for finding active lava flows.

"Discovering such flows would be a phenomenally exciting scientific finding," says Steve Chien, supervisor of the Artificial Intelligence Group at JPL. For example, volcanic activity could provide a source of heat, thus making it more likely that Martian microbes might be living in the frosty soil.

The instrument, called THEMIS (for Thermal Emission Imaging System), can "see" the heat emissions of the Martian surface in high resolution—each pixel in a THEMIS image represents only 100 meters on the ground. But THEMIS produces about five times more data than it can transmit back to Earth.



Just as changing cloud patterns on Earth were identified using Earth Observing-1's Advanced Land Imager along with ScienceCraft software, the THEMIS instrument with ScienceCraft on the Mars Odyssey spacecraft can avoid transmitting useless images.

Scientists usually know ahead of time which THEMIS data they want to keep, but they can't plan ahead for unexpected events like lava flows. So Chien and his colleagues are customizing artificial intelligence software called ScienceCraft to empower THEMIS to identify important data on its own.

This decision-making ability of the ScienceCraft software was first tested in Earth orbit aboard a satellite called Earth Observing-1 by NASA's New Millennium Program. Earth Observing-1 had already completed its primary mission, and the ScienceCraft experiment was part of the New Millennium Program's Space Technology 6 mission.

On Odyssey, ScienceCraft will look for anomalous hot-spots on the cold, night side of Mars and flag that data as important. "Then the satellite can look at it more closely on the next orbit," Chien explains.

Finding lava is considered a long shot, but since THEMIS is on all the time, "it makes sense to look," Chien says. Or better yet, have ScienceCraft look for you—it's the intelligent thing to do.

To learn more about the Autonomous ScienceCraft software and see an animation of how it works, visit http://ase.jpl.nasa.gov .

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Special Notice

Anyone with Internet access can download the latest newsletter (and any previous ones) from the club's website: www.amateurastronomy.org. Having the newsletter available online also allows us to publish it in full colour.

If you do not have Internet access, **you will still be able to pick up a paper copy at each meeting.** Copies of the newsletter will also be available to any newcomers at our meetings. **If you do not have Internet access, and cannot attend the meetings, please call Ann Tekatch at 905-575-5433 and she will place you on the special mailing list.**

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7:30 PM @

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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:

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The submission deadline is two weeks before each general meeting.