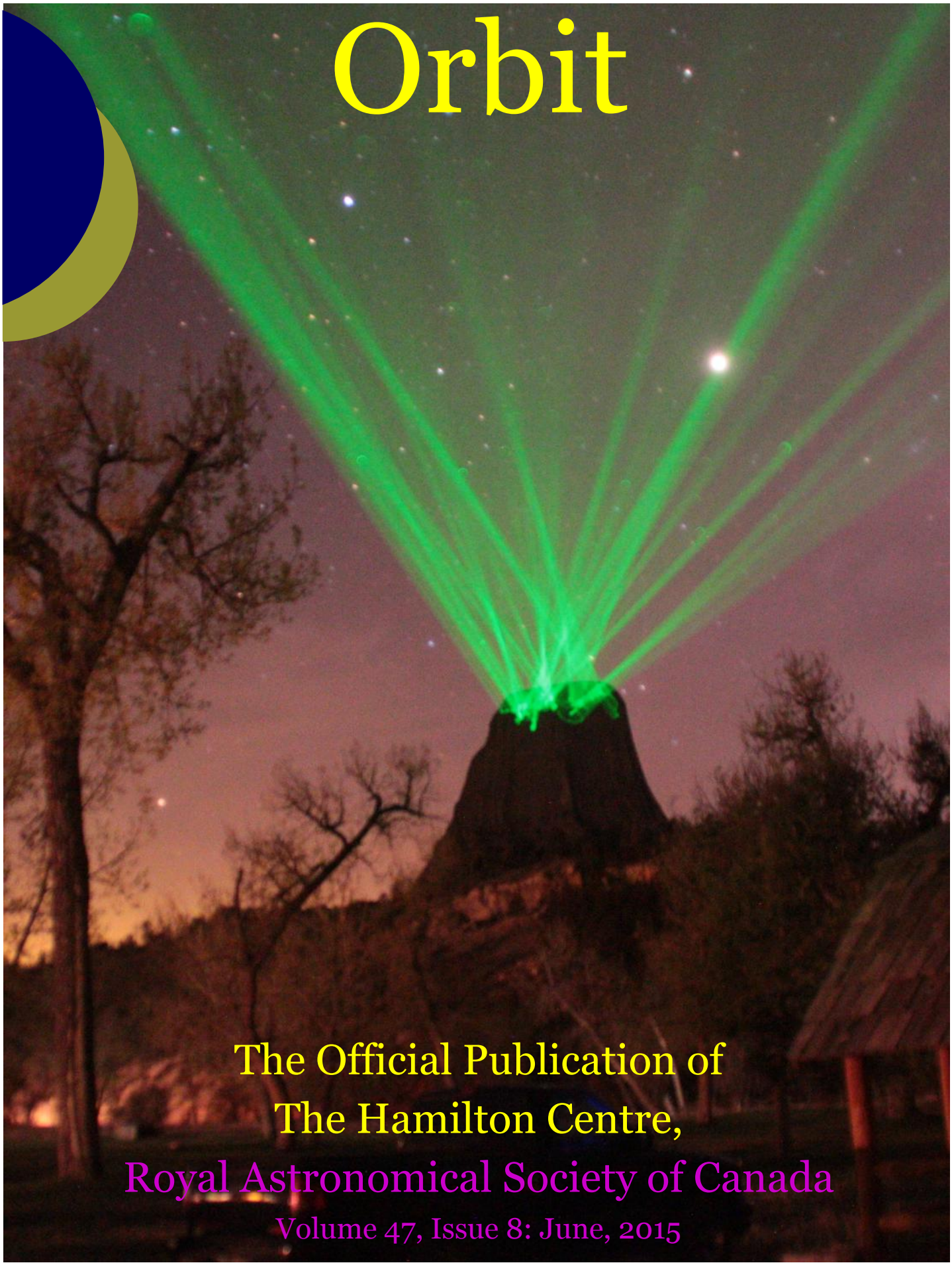
Orbit



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Issue Number 8, June, 2015
Roger Hill, Editor

Here we go...AstroCATS 2015!

If you haven't been to one before, then here's what you should know: AstroCATS is a great place to check out equipment. It's a great place to hear some great talks by some great speakers; do some solar observing; meet with some old friends and make some new ones. Unfortunately for me, it's increasingly looking like I will indeed have to work that weekend. I may be able to make the final couple of hours, so I'm hoping there are still some bargains left.

If, unlike me, you have some time to attend AstroCATS this year, the organizers sure could use your help. Go to http://www.astrocats.ca/volunteer.html and let them know your availability. It's always fun, and while it may be my imagination, I think volunteers may just get a little extra discount from the vendors.

Of course, with the venue being the Ontario Science Centre, there's always lots more to go for than just astronomy!

Head on over to the website—www.astrocats.ca—and check everything out.

One final thing...NEAF, in the US, is renowned for vendors using it to announce new products. I'm hearing that a Canadian company is going to use AstroCATS to do the same thing...and not just one product, but 3!

I had the opportunity after the May long weekend to do some driving into the US with my son. He'd been invited to be an usher at the wedding of a guy he'd know for years, but only online! I figured, though, if we were going to drive to Fargo, North Dakota, that we should take the opportunity to see what else was available in the area. Actually, there's really nothing to see in North Dakota, so I checked South Dakota, and found that Mount Rushmore was there, about 8 hours from Fargo. Also, the Devils Tower in Wyoming was less than three hours from Mount Rushmore.

So, we drove from Milton to Missouri Valley in Iowa (1500 km) and from there to Mount Rushmore (840 kilometers). The Devils Tower was 250km away. From there we drove 900km to Fargo, stayed for a couple of days, and then drove home via Sault Ste. Marie. (1800 km). We took a few detours and ended up doing some 5500km in 6 days. It was a lot of fun, and we saw some amazing things.

There were two things that stood out, though. I really liked Mount Rushmore, but I **LOVED** the Devils Tower. You may remember it from the Spielberg movie Close Encounters of the Third Kind, where the alien Mothership makes contact with humanity. We camped in a KOA right beside the entrance to the US National Park. Since it was a before the American Memorial Day Weekend, the campground was fairly quiet, so I decided to have some fun with my green laser.

I pointed the camera at the Tower, and "painted" the top of it with the laser, moving it from one side of the camera to the other as I did. Albeit a bit erratically. The resultant picture, on the front cover, makes it look like the laser light is coming from the top of the Tower. After I posted the picture to some friends, but without telling them how I managed it, they were aghast that the US National Park Service would do something like this, ruining the sense of awe and wonder of the place.

Fortunately, that's not how the picture was produced.

Have a great summer, pick up some bargains at AstroCATS and see you in September!

Roger

The "G" in GOES Is What Makes It Go

By Ethan Siegel

Going up into space is the best way to view the universe, eliminating all the distortionary effects of weather, clouds, temperature variations and the atmosphere's airflow all in one swoop. It's also the best way, so long as you're up at high enough altitudes, to view an entire 50 percent of Earth all at once. And if you place your observatory at just the right location, you can observe the *same* hemisphere of Earth continuously, tracking the changes and behavior of our atmosphere for many years.

The trick, believe it or not, was worked out by Kepler some 400 years ago! The same scientist who discovered that planets orbit the sun in ellipses also figured out the relationship between how distant an object needs to be from a much more massive one in order to have a certain orbital period. All you need to know is the period and distance of one satellite for any given body, and you can figure out the necessary distance to have any desired period. Luckily for us, planet Earth has a natural satellite—the moon—and just from that information, we can figure out how distant an artificial satellite would need to be to have an orbital period that exactly matches the length of a day and the rotational speed of Earth. For our world, that means an orbital distance of 42,164 km (26,199 miles) from Earth's center, or 35,786 km (22,236 miles) above mean sea level.

We call that orbit *geosynchronous* or *geostationary*, meaning that a satellite at that distance always remains above the exact same location on our world. Other effects—like solar wind, radiation pressure and the moon—require onboard thrusters to maintain the satellite's precisely desired position above any given point on Earth's surface. While geostationary satellites have been in use since 1963, it was only in 1974 that the Synchronous Meteorological Satellite (SMS) program began to monitor Earth's weather with them, growing into the Geostationary Operational Environmental Satellite (GOES) program the next year. For 40 years now, GOES satellites have monitored the Earth's weather continuously, with a total of 16 satellites having been launched as part of the program. To the delight of NASA (and Ghostbusters) fans everywhere, GOES-R series will launch in 2016, with thrice the spectral information, four times the spatial resolution and five times the coverage speed of its predecessors, with many other improved capabilities. Yet it's the simplicity of gravity and the geostationary "G" in *GOES* that gives us the power to observe our hemisphere all at once, continuously, and for as long as we like!

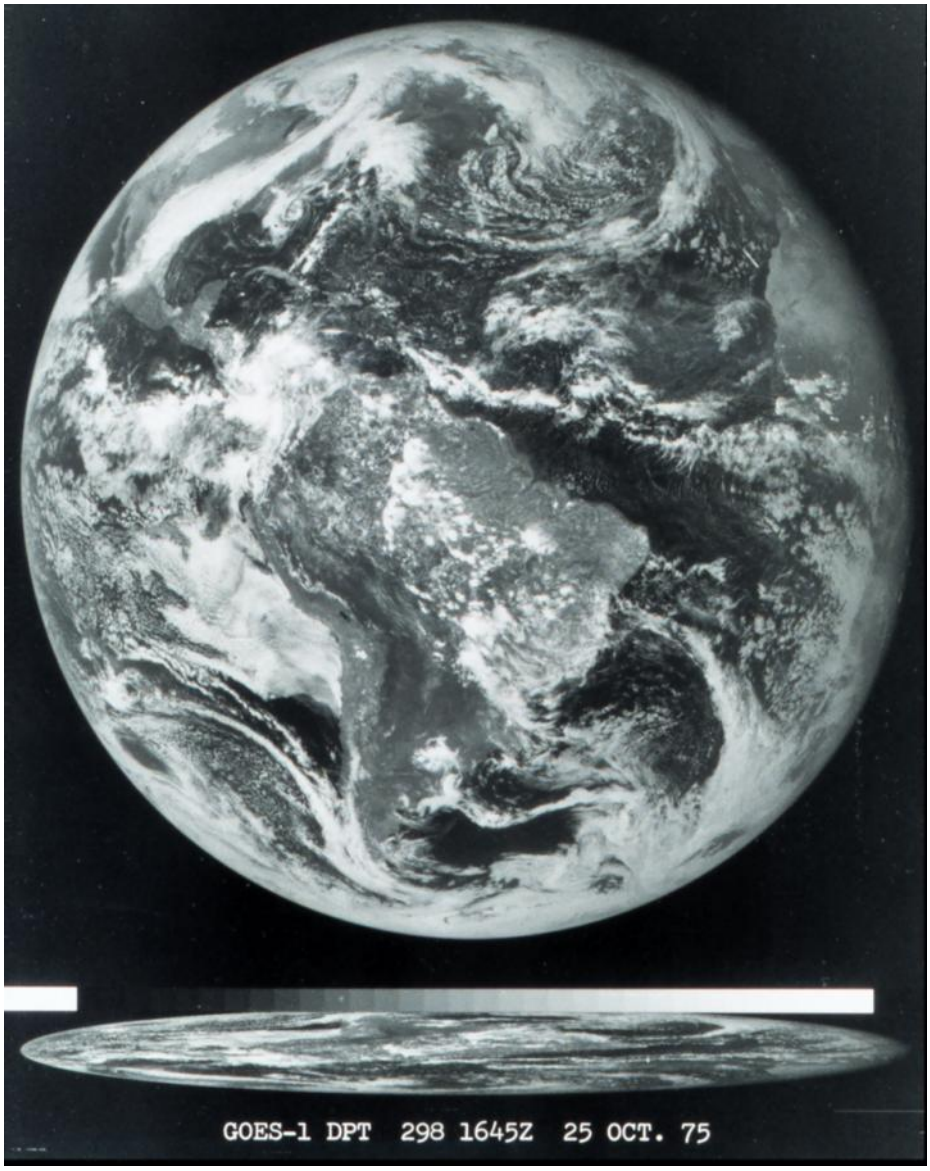


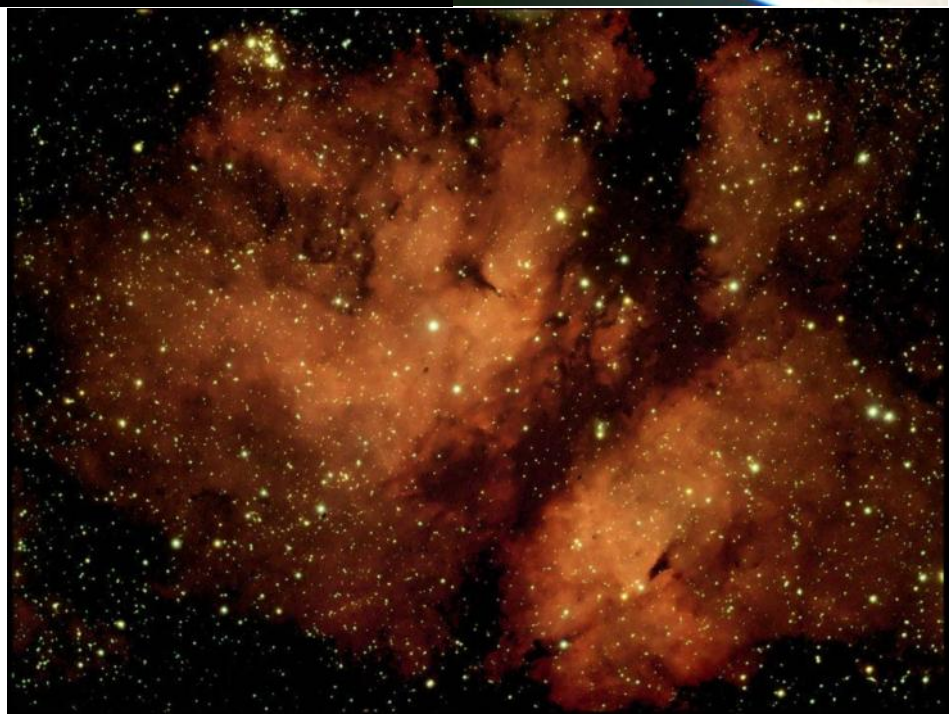
Image credit: National Oceanic and Atmospheric Administration, of the first image ever obtained from a GOES satellite. This image was taken from over 22,000 miles (35,000 km) above the Earth's surface on October 25, 1975.

We get pictures!

Mark Smith sent along this pair of Moon pictures. He used his phone, a Motorola Moto-X phone with a 26mm eyepiece and one of the Centre's 8" Dobsonians to take the two pictures of the Moon. So...you still think you need lots of equipment to take astrophotos? Well done, Mark!

Marks pictures got me to wondering what the best cell phone is to take lunar pictures and consequently, I'm thinking of setting up another evening of viewing the 1st Quarter Moon in July and we'll use the Centres 14" to test as many different phones as possible and then compare the results. This should be about July 24, or a couple of days later. We'll keep you posted!

Dave Dev sent along this picture of the gamma Cygni region. He used a 108mm refractor with an SBIG OSC camera on an Eq6 mount. He took 15 8-minute subframes for a total of 2 hours of exposure at StarFest in 2014



Dave sent along two more pictures. The first is of an HEQ5 that he "pimped". He took it all apart, replaced some internal parts with brass and tuned up some others. He painted it and then put it all back together.

It looks very nice, and judging by the picture on the previous page, it performs very nicely, too.

Dave sent along the picture of Ed Mizzi, also from StarFest last year.

The other picture was taken at the KOA Devils Tower in Wyoming. The skies got hazier through-out the evening, so doing any astronomy was ruled out.

For Sale!

There are a couple of items for sale this month.

The first is a polarscope for an EQ8 that **Dave Dev** is selling. You can find details about it on the AstroBuySell website at http://www.astrobuysell.com/propview.php?view=33163 .

Greg Stopelli has a 10" Dobsonian that he is selling. It is homebuilt and uses an Orion primary mirror and secondary.

The scope has a Telrad finder mount on it, but not the Telrad itself. He's including a couple of eyepieces, too.

The price? He's asking $350.

As a point of comparison, a new Orion Dobsonian is currently $668.

Warning...it may already have been Sold as Greg took it to the NOVA session on Monday evening, and someone else took it home to try it out

If you're interested, send me an email at Orbit@hamiltonrasc.ca and I'll pass it on to them.

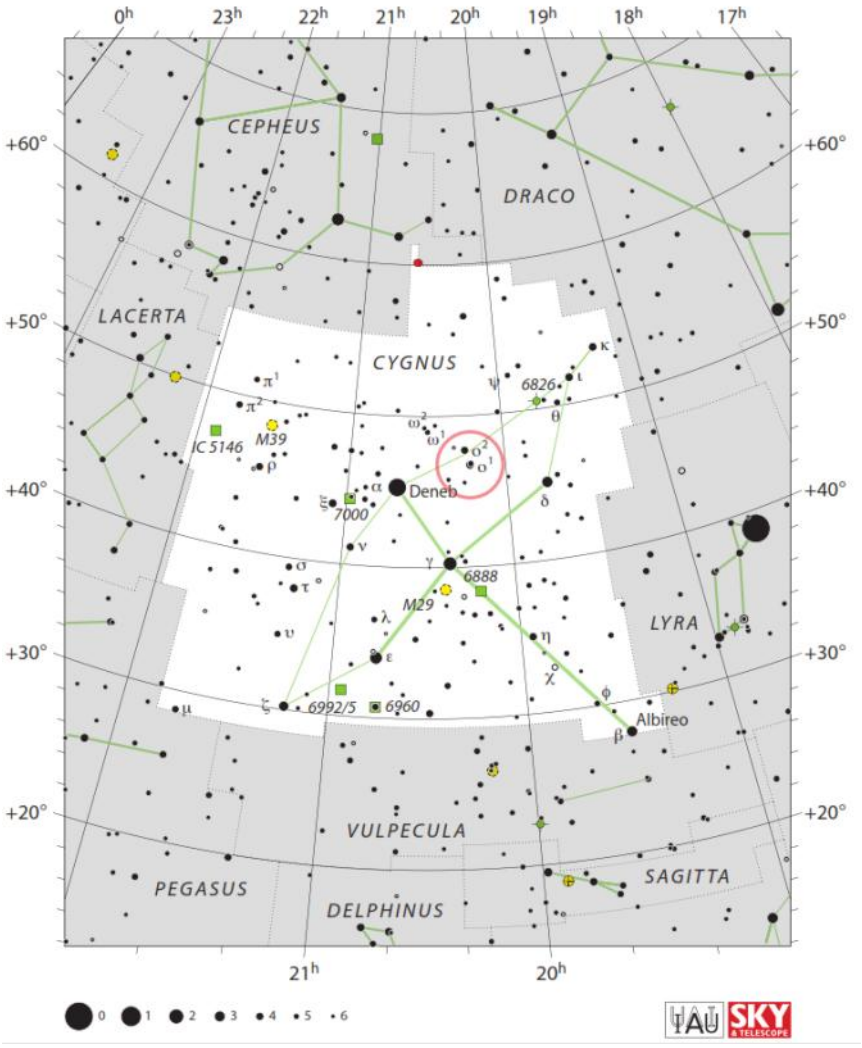
The Patriotic Triple and Other Cygnus Treats by David A. Rodger

Forget galaxies! Okay, so that's a bit over the top. There are galaxies I can see with a refractor in the city. M31 in Andromeda and M81 and M82 in Ursa Major come to mind. But my 127mm f/5.2 refractor's strength in deep sky observing is to be found among the double stars and star clusters generously sprinkled across the sky. I get much more enjoyment when I point the tube their way.

I could spend the entire season exploring the attractions of the Cygnus region. For example, there's the beautiful double star Albireo (Beta Cygni). I never tire of gazing at this blue and gold pair in my telescope. Cygnus' two Messier clusters are impressive, too. There's M29, the principal stars of which my wife Sharon calls "the cow's face." And there's M39, a well populated star cluster in the northern region of Cygnus. I've seen the subtle strands of the Veil Nebula in my refractor, but only when I've attached an OIII filter to a low power, wide-field eyepiece. The Veil is not an easy urban sky object by any means. On the other hand, I can't count the many hours I've spent with a modest pair of binoculars slowly scanning the Milky Way as it meanders through Cygnus. And then there's "Rocha."

You might not have heard of Rocha, at least not by that name. In Arabic, according to Richard Hinckley Allen in his monumental Star Names: Their Lore and Meaning, it means "the bird's knees." (There's a similarly named star in Cassiopeia, my favourite books, Celestial Objects for Modern Telescopes, author Michael Covington notes the distinct colours of the three stars—red, white and blue—and dubs them "the Patriotic Triple." The Philadelphia Flyers' virtual anthem singer Kate Smith would be proud.

How sharply delineated these three stars and their distinctive colours appear will depend on the telescope, of course. I first noted the trio in my 100mm (4-inch) Orion refractor several years ago, and saw the 4 magnitude red star as ochre—the colour of Mars when it's far from opposition. The slightly fainter white star is 330 seconds of arc away, according to Covington. The blue component is the faintest, at 7 magnitude. In my 127mm (5-inch) refractor, those colours are confirmed.

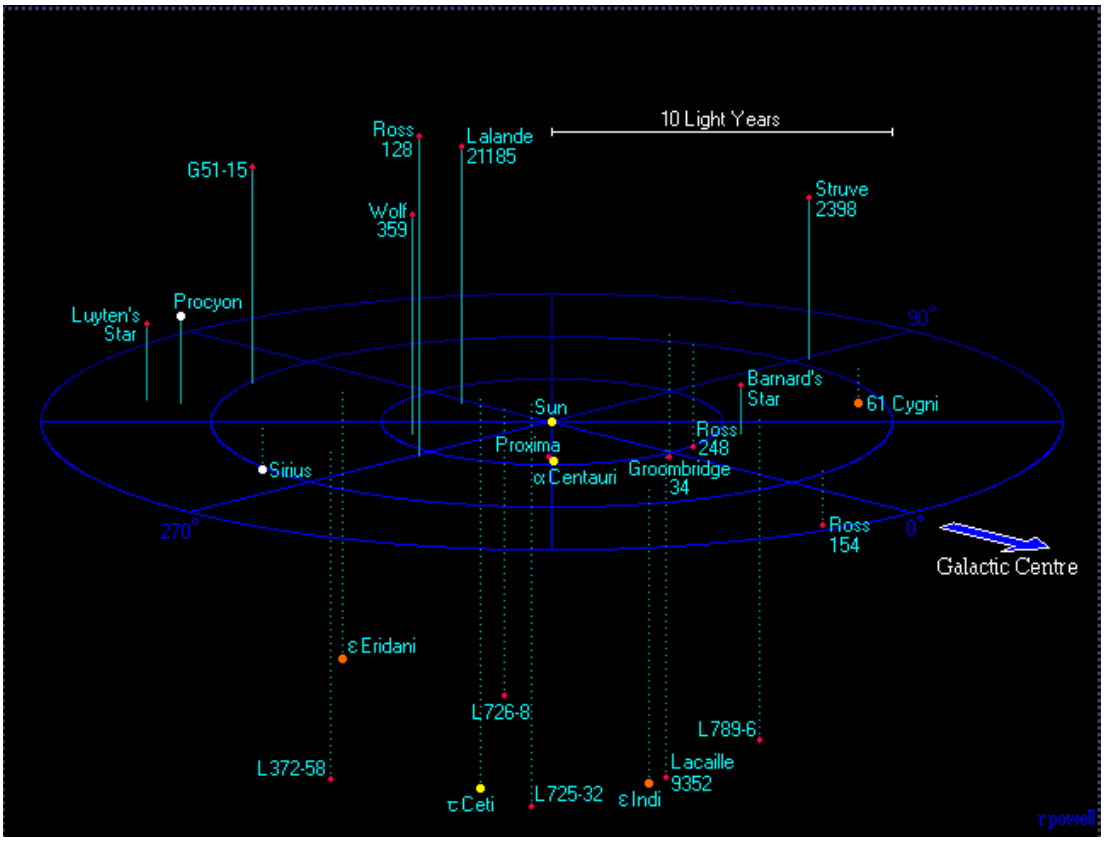


Double star experts, such as James Maloney and Sissy Haas, seem to agree that, notwithstanding the appeal of the Patriotic Triple, this is just a chance alignment. The trio, in other words, is not a true multi-star system, but three unrelated stars that happen to lie in the same area when viewed from here. In his Celestial Handbook, Robert Burnham Jr. lists their distances from Earth as 107, 338 and 36.6 light-years respectively. Ironically, the faintest star is the one closest to us.

When people crowd about your telescope on summer evenings asking for a peek, show them the Patriotic Triple. They won't be disappointed.

David A. Rodger was the first Director of the HR MacMillan Planetarium in Vancouver (1967-80), and is a life-long amateur astronomer. He observes the sky from his North Vancouver townhouse.

The Universe within 12.5 Light Years—The Nearest Stars



This map shows all the star systems that lie within 12.5 light years of our Sun. Most of the stars are red dwarfs - stars with a tenth of the Sun's mass and less than one hundredth the luminosity. Roughly eighty percent of all the stars in the universe are red dwarfs, and the nearest star - Proxima - is a typical example.

Proxima Centauri - Type=M5, Magnitude=11.0, Distance=4.22 ly This dim red dwarf is the nearest star to the Sun, and it is a member of the Alpha Centauri system despite lying 0.24 light years from the main pair of stars, requiring over one million years to orbit them. Proxima was discovered in 1915 by Robert Innes and was at that time the least luminous star known. It is also a flare star - capable of brightening a magnitude or more in minutes.

Alpha Centauri A,B - Type=G2+K0, Magnitudes=0.0+1.4, Distance=4.39 ly Just slightly further from us than Proxima, lie the orange and yellow dwarf stars that make up Alpha Centauri. Orbiting each other in an 80 year period, together they make up one of the brightest objects in southern hemisphere skies. Seen from Alpha Centauri, the third member of the system, Proxima, is a dim (magnitude 4.8) star.

Barnard's Star - Type=M5, Magnitude=9.6, Distance=5.94 ly Famous for having the largest proper motion of any star, this dim red dwarf travels 0.29 degrees against the background sky in a century. Discovered by E Barnard in 1916, it was thought in the 1960's to have a couple of unseen planets orbiting it, but later observations disproved this. In another 8000 years Barnard's Star will become the closest star to us.

Wolf 359 - Type=M6, Magnitude=13.5, Distance=7.80 ly. An excessively dim red dwarf discovered by Max Wolf in 1918. For 25 years it was the least luminous star known.

Lalande 21185 - Type=M2, Magnitude=7.5, Distance=8.31 ly. Recorded in JJ Lalande's star catalogue compiled in the 1790's, this is one of the brightest red dwarfs in the sky, but it still needs binoculars to see it. G Gatewood reported in 1996 the possible indications of a couple of Jupiter sized planets orbiting it but this remains unconfirmed.

Sirius A,B - Type=A1+DA, Magnitudes=-1.4+8.4, Distance=8.60 ly. This brilliant white star is the brightest star in the night sky and the most luminous star within 25 light years. Its white dwarf companion was first seen in 1852, the first white dwarf ever seen. The orbital period is 50 years.

Luyten 726-8 A,B - Type=M5+M5, Magnitudes=12.4+13.3, Distance=8.73 ly. This is a dim binary system consisting of two red dwarfs. The system is perhaps more famously known as UV Ceti, the variable-star name of the second star in the system. It is a famous flare star and can visibly brighten by several magnitudes as it ejects flares from its surface similar to the ones seen on the surface of the Sun, but far more energetic. Both stars require about 200 years to orbit each other.

Ross 154 - Type=M4, Magnitude=10.4, Distance=9.69 ly. A dim red dwarf. It is one of a number of nearby stars catalogued by Frank Ross in the 1930's. It is also a known flare star.

Ross 248 - Type=M6, Magnitude=12.3, Distance=10.33 ly Another dim red dwarf.

Epsilon Eridani - Type=K2, Magnitude=3.7, Distance=10.50 ly. An orange dwarf star. This star was searched for signs of intelligent life with the Green Bank radio telescope in 1960. The results, predictably, were negative. The IRAS satellite detected a lot of dust orbiting this star indicating a possible forming solar system, and even more recently, (Aug 2000), a Jupiter sized planet has been detected orbiting this star at a distance of 3.2 AU (480 million km).

Lacaille 9352 - Type=M2, Magnitude=7.4, Distance=10.73 ly. A fairly bright red dwarf which can easily be seen with binoculars, it was first recorded in Nicolas de Lacaille's catalogue of southern hemisphere stars compiled around 1752.

Ross 128 - Type=M4, Magnitude=11.1, Distance=10.89 ly. A dim red dwarf, also known as FI Vir - its variable star designation.

Luyten 789-6 A,B,C - Type=M5+M5+M7, Magnitudes=13.3+13.3+14.0, Distance=11.1 ly. There seems to be three red dwarfs in this system

Procyon A,B - Type=F5+DA, Magnitudes=0.4+10.7, Distance=11.41 ly. A brilliant yellow-white star, and the eighth brightest star in the sky. With twice the diameter of the Sun, Procyon is also the largest star within 25 light years. Procyon is orbited by a white dwarf companion first seen optically in 1896. The orbital period is 41 years.

61 Cygni A,B - Type=K5+K7, Magnitudes=5.2+6.1, Distance=11.41 ly. This binary system of two orange dwarf stars is famous for being the first star ever to have its distance measured by F Bessel in 1838. Both stars are very similar but are widely separated (86 AU) requiring about 700 years to orbit each other.

Struve 2398 A,B - Type=M4+M5, Magnitudes=8.9+9.7, Distance=11.6 ly. A binary system of two red dwarfs named Struve 2398 from a catalogue of double stars published in 1827. This system is also known by the rather more boring name of BD+59°1915. The two stars are quite widely separated (50 AU) and orbit each other in a 450 year period.

Groombridge 34 A,B - Type=M2+M6, Magnitudes=8.1+11.1, Distance=11.64 ly. Another pair of red dwarfs, this system is usually called Groombridge 34 from an 1838 catalogue of northern stars or sometimes BD+43°44. Both stars are variable in brightness and have the variable star names of GX And and GQ And. Both stars lie far apart from each other (150 AU) and orbit each other in a 2500 year period.

Giclas 51-15 - Type=M6, Magnitude=14.8, Distance=11.8 ly. This excessively dim red dwarf is the least luminous star within 14 light years. It shines with just 0.01% of the Sun's luminosity.

Epsilon Indi A,B,C - Type=K5+T1+T6, Magnitude=4.7, Distance=11.83 ly. An orange dwarf. It is a similar star to Epsilon Eridani, although a little bit smaller and dimmer. Epsilon Indi is orbited by a pair of brown dwarfs - failed stars that are too small to burn. They were discovered in 2003 and they orbit each other in a 16 year period, and they are 1500 AU (220 billion km) from the main star and they require about 70 000 years to orbit it.

Tau Ceti - Type=G8, Magnitude=3.5, Distance=11.90 ly. The nearest, single, sun-like star. It was searched (unsuccessfully) for any signs of intelligent life in 1960, along with Epsilon Eridani.

Luyten 372-58 - Type=M5, Magnitude=13.0, Distance=12.1 ly. A very dim red dwarf. Although this star was catalogued decades ago, it has only recently had its distance determined with any accuracy.

Luyten 725-32 - Type=M5, Magnitude=12.1, Distance=12.1 ly. Another dim red dwarf.

Luyten's Star - Type=M3, Magnitude=9.8, Distance=12.39 ly. A red dwarf. It is named after Willem Luyten who realised it was a nearby star in 1935. The star lies just 1.2 light years away from Procyon, but it is not associated with it.

If the Night Were Void of Stars

Twould be lonely, 'twould indeed,
It the night were void of stars

How we'd miss the friendly warmth
This heavenly host of ours.

No Swan to wing the northern sky,
Nor mighty Hercules.

No Bear to roam the starry wood,
Nor Charming Pleiades.

No Crown to place on kingly heads,
Nor Dragon there to prey

Upon unwary souls that stroll,
Along the Milky Way.

The planets also we would miss,
Venus, Saturn, Mars

'Twould be lonely, 'twould indeed,
If the night were void of stars.

-G. O. Pitcovich

Midnight.....

There is no sound in the forest -
only the phantom murmur
of the far wind
and the wind's shadow drifting
as smoke
through ebon branches; there a single star
glistens in the heart of night....
A star!
Look skyward now...
and see above...INFINITY
Vast and dark and deep
and endless....your heritage:
Silent clouds of stars,
Other worlds uncountable and other suns
beyond numbering
and realms of fire-mist and star-cities
as grains of sand....
drifting...
Across the void....
Across the gulf of night....
Across the endless rain of years....
Across the ages.
Listen!
Were you the star-born you should hear
That silent music of which the ancient sages spoke
Though in silent words...
Here then is our quest
and our world
and our Home.
Come with me now, Pilgrim of the stars,
For our time is upon us and our eyes
shall see the far country
and the shining cities of Infinity
which the wise men knew
in ages past, and shall know again
in the ages yet to be.
Look to the east....there shines
the Morning Star...soon shall the sunrise come...
We await the Dawn,
Rise, oh eternal light;
Awaken the World!
With trumpets and cymbals and harp and the sound
of glad song!
And now...
The clouds of night are rolled away;
Sing welcome to the Dawn
Of the bright new day!

From Burnham's Celestial Handbook, by Robert Burnham Jr., 1978.

"Earthshine"

On certain nights
When the angles are right
And the moon is a slender crescent

Its circle shows
In a ghostly glow
Of earthly luminescence

Earthshine
A beacon in the night
I can raise my eyes to
Earthshine
Earthshine
A jewel out of reach
Form a dream to rise to
Earthshine

Floating high
In the evening sky
I see my faint reflection

Pale facsimile
Like what others see
When they look in my direction

Earthshine
Stretching out your hand
Full of starlit diamonds
Earthshine

Reflected light
To another's sight
And the moon tells a lover's story

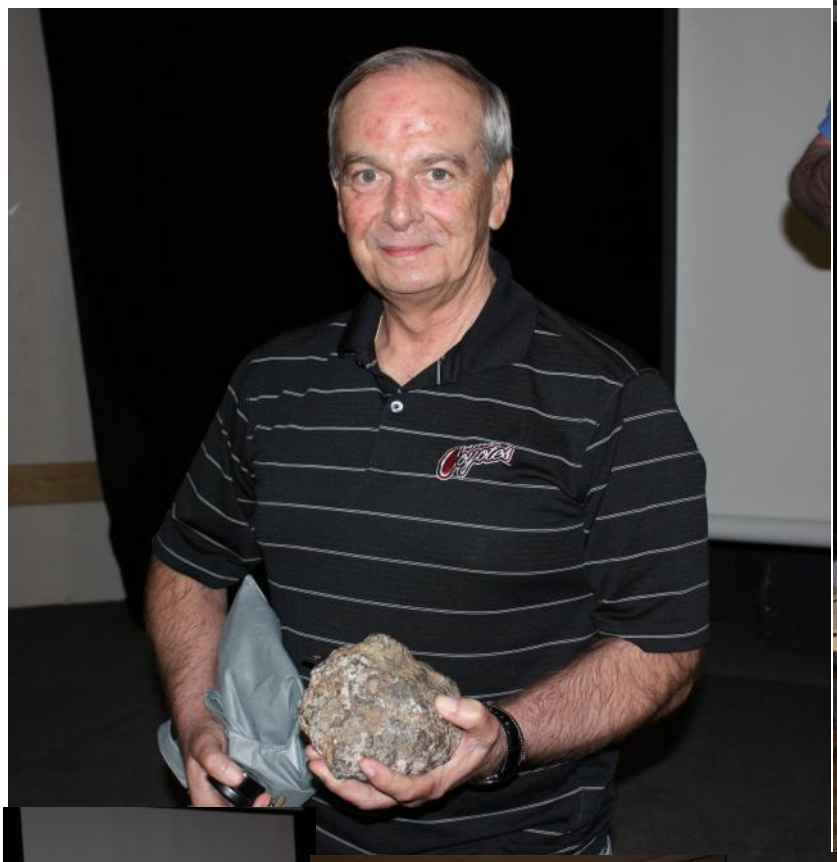
My borrowed face
And my third-hand grace
Only reflect your glory

You're still out of reach
Form a dream to rise to
Earthshine

- Neil Peart

What you missed last month…pictures by Roger Hill

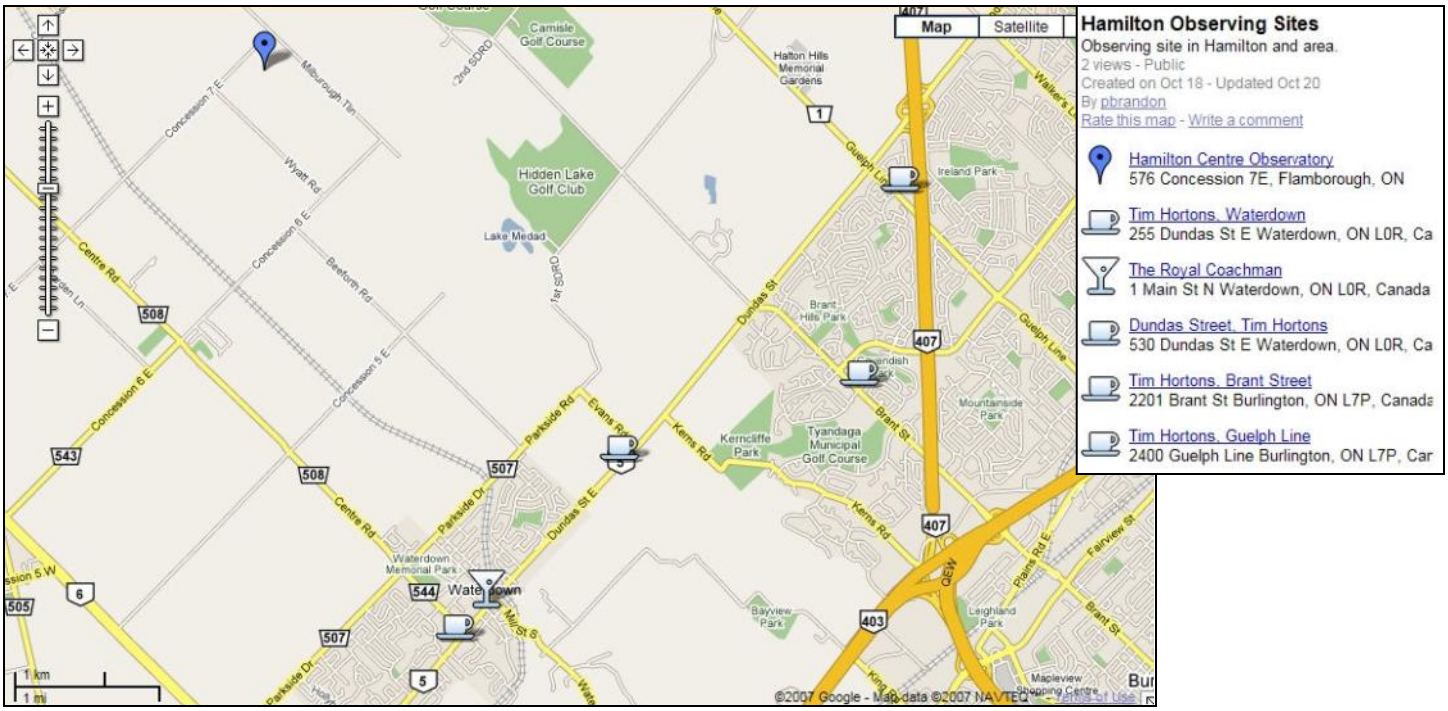
Our speaker for the May meeting was Paul Mortfield, who spoke about his 40 years of astrophotography. There was also an appearance by a possible meteorite that had been found in a farmers field a week or two earlier. And we had TWO book reviews. One by Chris Talpas and another by Ed Mizzi...see last month's Orbit for details! If you weren't there, you missed a great evening!



Calendar of Events

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
May 31 Full Moon: The Flower Moon	**June 1** **NOVA Session 7 at the Observatory, 7:30pm**	**June 2** **Full Moon** **The Strawberry Moon**	**June 3**	**June 4** **General Meeting in Waterdown:** **Speaker:** Keith Jarvie, Ph.D. on Chandrasekhar's Limit	**June 5**	**June 6** **Venus at Greatest Elongation E (45°)**
June 7	**June 8** **NOVA Session 8 at the Observatory, 7:30pm**	**June 9** **Last Quarter**	**June 10**	**June 11** **Board Meeting. Contact Gary Colwell for location.**	**June 12**	**June 13** **Venus 1° above the Beehive Cluster (M44)**
June 14	**June 15**	**June 16** **New Moon**	**June 17**	**June 18**	**June 19** Moon 7° S of Venus, Jupiter nearby	**June 20** Moon 6 ° lower left of Jupiter, Venus nearby
June 21 **Summer Solstice 12:38pm EDT**	**June 22**	**June 23** Lunar X 11:30pm EDT	**June 24** First Quarter Lunar Straight Wall this evening.	**June 25** Venus 3° to the lower right of Jupiter	**June 26**	**June 27** **AstroCATS**
June 28 **AstroCATS** Venus 1.2° to the lower right of Jupiter	**June 29**	**June 30** Venus 20' below Jupiter—closest approach.	**July 1** Full Moon—The Thunder Moon	**July 2**	**July 3**	**July 4** Earth at Aphelion— 152,093,476 km

Mercury very low in ENE in morning twilight last week of the month. **Venus** very low in WNW in evening twilight. **Mars** is not observable this month. **Jupiter** in W during twilight, sets in NW near midnight. **Saturn** in S at dusk, sets in WSW near dawn.



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Dave Surette, Secretary
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Chris Talpas, Librarian

This image of the Rosette was produced by Mehdi Bozzo-Rey from a series of images taken by Roger Hill with a 300mm SMC Takumar lens at f/4. The camera was a modified Canon T1i, with an Astronomik 6nm Hydrogen-Alpha filter. The lens and camera were piggybacked on the Centre’s 16” RC. It is unguided