# Orbit

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# Issue Number 3, December, 2011
## Roger Hill, Editor

Santa didn't bring me the LX200 wireless hand controller, but he did deliver a couple of very nice things that will help me astronomically. The first was Terry Dickenson's calendar for 2011. Another was a 7.4 volt adapter for my Canon XSi, which will allow me to run the camera off house current.

The calendar is gorgeous, and chock full of all kinds of great information. There are a number of images taken by Terry, but the biggest disappointment to me was one taken by Alan Dyer of the Saskatchewan Summer Star Party. It appears to be taken from a frame of one of the movies that Alan is rightly famed for. The problem is that the stars are trailed. While this is not a problem when you're viewing the movie on YouTube, when you blow one frame up to the size of a calendar page, then the flaws really show up. Considering that Alan Dyer is a great astrophotographer in his own right, with some spectacular images to his credit, the inclusion of this picture seems a sop to Canadian content.

I'm looking forward to getting the chance to use the 7.4 Volt adapter. This nifty bit of equipment allows me to use my camera without the batteries. In the middle of winter, it seems as if I just managed to get the camera focussed, the object centred, the autoguider running nicely, and the battery in the camera would fail. Replacing it always seemed to involve inadvertent small movements of the camera, and while it wouldn't take as long the second time to get everything working again, it was a pain.

I also downloaded a program I spotted the other day. It's called Bahtinov Grabber ( http://www.njnoordhoek.com/?p=325 ), and what it does is monitor part of your screen where you can display the diffraction patter from a Bahtinov mask. It then measures the absolute error in focussing. If you manually focus, it will display the error, and if you have an ASCOM compliant focuser (like my LX200GPS), then it will autofocus! Best of all, it will work for any camera with Live View (or equivalent). If we ever see starlight again, I'll check it out. If it works as well as it's advertised to do, then I'll be making masks for all my lenses and scopes. I may even make one for the Centres 16"!

Another piece of software I'm having a look at is one called Backyard EOS ( http://backyardeos.binaryrivers.com/home ) , that claims to be able to automate many of the tasks that are necessary to good astrophotos. This also includes things like putting the temperature and object name into the EXIF data, as well as creating a directory structure that includes that information. It also offers live FWHM (Full Width Half Maximum) feedback to get critical focus. It works with any lens or telescope. It will stack the live view so you can see the object you're trying to image; automatically put you into RAW mode; it will drive some autofocus lenses, but use FWHM on stars to get best focus, and all sorts of other tricks. Oh...it'll help with polar alignment, too.

So...more toys to play with! I just need some spare time and clear skies.

In Centre news, we're gearing up to start the astrophotography group with a bang! The 16" has been polar aligned, balanced, t-pointed, and collimated. According to Andy and the others who did the work, the scope is performing incredibly well. The next step is to get it auto-focussing for Canon cameras. A new focuser is on it's way (or about to be ordered), and along with some software not dissimilar to Backyard EOS, will allow a Canon EOS to be perfectly focussed on the 16". After that, some other software will allow you to completely automate the process of taking images for later processing at home.

And yet, so I'm told (and I insisted on), the electric focuser will mean that the visual observers among us will see perfect little pinpoint stars.

Our year long series of meetings at Discovery Landing in Burlington has had to come to an end. We were getting a sweetheart deal, but with the change of management (from Burlington Parks and Rec to Spencer's Restaurant) we were unable to get our monthly rental extended.

So (as meeting attendees know), we needed to find a new meeting site. We searched a number of places, and the good people at Burlington Parks and Rec tried to help us out, but they were no cheaper than the Hamilton Steam and Technology Museum. We tried a number service clubs in the area, but there were problems with all of them.

Finally, some bright person suggested the Waterdown legion. It turns out they have a large meeting room that is frequently used by local cubs, scouts and Girl Guide groups. Ed Mizzi, who lives in Waterdown went to check them out, and found a great room that sounds ideal for us (I haven't had a chance to heck the place out yet). The time slot we wanted (8 to 10pm on the first Thursday of the month) was available, although a Girl Guide group has the facility until 8pm...perhaps some of them will stay behind!

There is a restaurant, Turtle Jacks, in the area, as well as a couple of pubs. We'll give Turtle Jacks a try first, as they're likely to have the widest variety of food.

We did have to do one thing, though. The Legions does not have a projection screen, so we had to buy one. We got the biggest one we could, commensurate with our funds, and it arrived just a few days ago as I write this. I tried opening it up in my basement to see what it's like, but it's too tall for there. I took it to the Observatory the night of the Levee, where it now resides. I'm not sure if I'll leave it there, but with the meetings in Waterdown, not far from the Observatory, it might be best to pick up the projector and other meeting stuff from their and return it that night, or the next day. Certainly that would make it easier for someone to get it to meetings when I can't make it.

Our February meeting will be held in Toronto. It's not the first time we've done this, but it has been a few years since we met at the City TV studios on Queen Street to hear David Onley give a talk. Anyway, this time our meeting will be on a Saturday night at David Dunlap Observatory in Richmond Hill. We've arranged for a tour of the place on Saturday the 5th of February. Unfortunately, we'll need to charge for this one: $10 a head. We'd like to encourage you to bring a friend or family member with you, as it promises to be a special night. We're really hoping it will be clear, allowing us a look through a 74" telescope!

I'd like to extend my thanks to Andy Blanchard for organizing this years Levee at the Observatory. The place was a bit warmer this year, and not just because there were more people there! A few oil-filled heaters did a great job of getting the air temperature up to reasonable levels. Of course, it didn't hurt that the day-time temperature of +9C meant that it started off warmer than last year!

It was several hours of socializing and chatting. I got to meet a few people outside of the few minutes available to me at our regular meetings. Although Andy jokingly tried to stop people talking about Astronomy, that didn't last long, and a good time was had by all. In fact, if you want to see a big grin, ask Mark Pickett how much he's enjoying being our National Representative!

In fact, topics ranged widely from discussions about cameras (film and digital), to politics on the national scene, from observing techniques to telescope design; from observing sites to solar eclipses...and that was just some of the conversations I was part of! If we do this again next year, and I hope we do, I hope you'll drop by for a very pleasant evening.

Clear skies, one and all,

Roger Hill
Orbit editor and President.

*Space Place Partners' column January 2011*

# Astronomers Stumble onto Huge Space Molecules

By Trudy E. Bell and Tony Phillips

Deep in interstellar space, in a the swirling gaseous envelope of a planetary nebula, hosts of carbon atoms have joined together to form large three-dimensional molecules of a special type previously seen only on Earth. Astronomers discovered them almost accidentally using NASA's Spitzer Space Telescope. "They are the largest molecules known in space," declared Jan Cami of the University of Western Ontario, lead author of a paper with three colleagues published in *Science* online on July 22, 2010, and in print on September 3.

Not only are the molecules big: they are of a special class of carbon molecules known as "fullerenes" because their structure resembles the geodesic domes popularized by architect Buckminster Fuller. Spitzer found evidence of two types of fullerenes. The smaller type, nicknamed the "buckyball," is chemical formula C60, made of 60 carbon atoms joined in a series of hexagons and pentagons to form a spherical closed cage exactly like a black-and-white soccer ball. Spitzer also found a larger fullerene, chemical formula C70, consisting of 70 carbon atoms in an elongated closed cage more resembling an oval rugby ball.

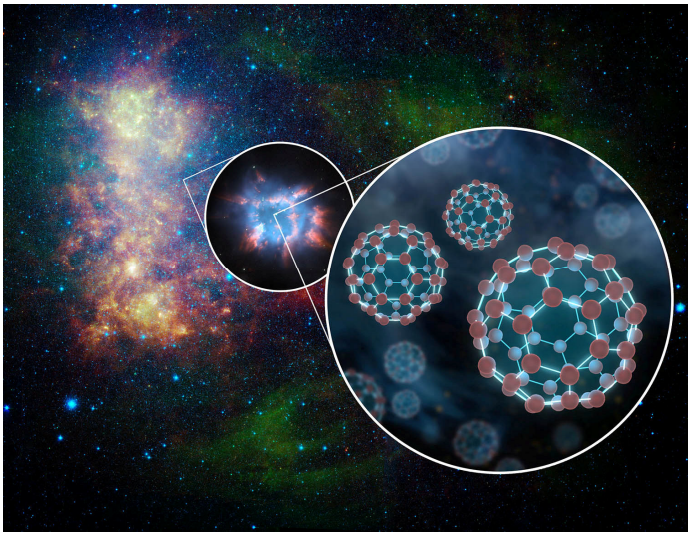
Neither type of fullerene is rigid; instead, their carbon atoms vibrate in and out, rather like the surface of a large soap bubble changes shape as it floats through the air. "Those vibrations correspond to wavelengths of infrared light emitted or absorbed—and that infrared emission is what Spitzer recorded," Cami explained.

Although fullerenes have been sought in space for the last 25 years, ever since they were first identified in the laboratory, the astronomers practically stumbled into the discovery. Co-author Jeronimo Bernard- Salas of Cornell University, an expert in gas and dust in planetary nebulae, was doing routine research with Spitzer's infrared observations of planetary nebulae with its spectroscopy instrument. When he studied the spectrum (infrared signature) of a dim planetary nebula called Tc 1 in the southern hemisphere constellation of Ara, he noticed several clear peaks he had not seen before in the spectra of other planetary nebulae.

"When he came to me," recounted Cami, an astrophysicist who specializes in molecular chemistry, "I immediately and intuitively knew it I was looking at buckyballs in space. I've never been that excited!" The authors confirmed his hunch by carefully comparing the Tc 1 spectrum to laboratory experiments described in the literature.

"This discovery shows that it is possible—even easy—for complex carbonaceous molecules to form spontaneously in space," Cami said. "Now that we know fullerenes are out there, we can figure out their roles in the physics and chemistry of deep space. Who knows what other complex chemical compounds exist—maybe even some relevant to the formation of life in the universe!"

Stay tuned!



*Superimposed on a Spitzer infrared photo of the Small Magellanic Cloud is an artist's illustration depicting a magnified view of a planetary nebula and an even further magnified view of buckyballs, which consist of 60 carbon atoms arranged like soccer balls.*

Learn more about this discovery at http://www.spitzer.caltech.edu. For kids, there are lots of beautiful Spitzer images to match up in the Spitzer Concentration game at http://spaceplace.nasa.gov/en/kids/spitzer/concentration.

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

*Space Place Partners' column January 2011*

# Blue Rings around Red Galaxies

by Trudy E. Bell and Dr. Tony Phillips

Beautiful flat rings around the planet Saturn are one thing—but flat rings around entire galaxies? That is the astonishing discovery that two astronomers, Samir Salim of Indiana University at Bloomington and R. Michael Rich of UCLA described in the May 10, 2010, issue of *The Astrophysical Journal Letters.*

"For most of the twentieth century, astronomers observing at visible wavelengths saw that galaxies looked either 'red and dead' or 'blue and new,'" explained Salim. Reddish galaxies were featureless, shaped mostly like balls or lentils; bluish ones were magnificent spirals or irregular galaxies.

Elliptical galaxies looked red, astronomers reasoned, because they had mostly old red giant stars near the end of their life cycles, and little gas from which new stars could form. Spiral and irregular galaxies looked blue, however, because they were rich in gas and dust that were active nurseries birthing hot, massive, bluish stars.

At least, that's how galaxies appear in visible light.

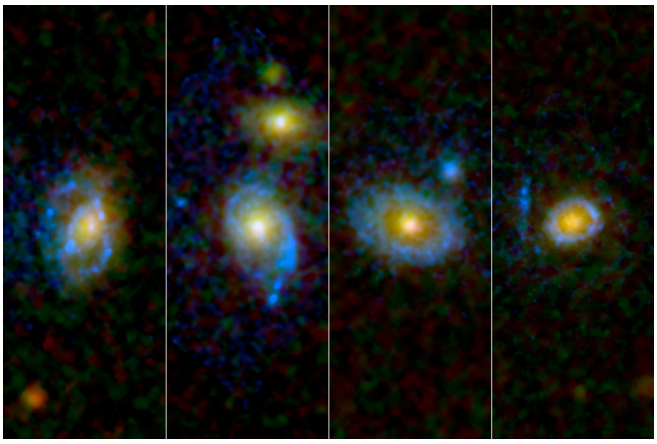
As early as the 1970s, though, the first space-borne telescopes sensitive to ultraviolet radiation (UV) revealed something mysterious: a few red elliptical galaxies emitted "a surprising ultraviolet excess," said Rich. The observations suggested that some old red galaxies might not be as "dead" as previously supposed.

To investigate, Salim and Rich used NASA's Galaxy Evolution Explorer satellite to identify 30 red elliptical galaxies that also emitted the strongest UV. Then they captured a long, detailed picture of each galaxy using the Hubble Space Telescope.

"Hubble revealed the answer," says Salim. The UV radiation was emitted by enormous, flat bluish rings that completely surrounded each reddish galaxy, reminiscent of the rings of Saturn. In some cases, the bluish rings even showed a faint spiral structure!

Because the bluish UV rings looked like star-forming spiral arms and lay mostly beyond the red stars at the centers of the elliptical galaxies "we concluded that the bluish rings must be made of hot *young* stars," Salim continued. "But if new stars are still being formed, that means the red and dead galaxies must have acquired some new gas to make them." How does a galaxy "acquire some gas?" Salim speculates that it was an act of theft. Sometimes galaxies have close encounters. If a gas-rich irregular galaxy passed close to a gas-poor elliptical galaxy, the gravity of the elliptical galaxy could steal some gas.

Further studies by Galaxy Evolution Explorer, Hubble and other telescopes are expected to reveal more about the process. One thing is certain, says Rich: "The evolution of galaxies is even more surprising and beautiful than we imagined."



*The Galaxy Evolution Explorer UV space telescope helped to identify red elliptical galaxies that also emitted the strongest UV. These are detailed, long-exposure Hubble Space Telescope images of four of these galaxies that capture the UV-emitting rings and arcs indicative of new star formation.*

The press release is available at http://www.galex.caltech.edu/newsroom/glx2010-03f.html. The full published article is "Star Formation Signatures in Optically Quiescent Early-Type Galaxies" by Samir Salim and R. Michael Rich, *The Astrophysical Journal Letters* 714: L290–L294, 2010 May 10. Point the kids to the Photon Pile-up Game at http://spaceplace.nasa.gov/en/kids/galex/photon, where they can have fun learning about the particle nature of light.

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

# **The Zoo in the Sky** by Gary Colwell

Have you ever stopped for a few moments and realized that one of the least know zoo's in the world is actually out of this world?.... One night when I had not much to think about, this crazy idea popped into my head….think of the number of nighttime objects are named after animals….the first that popped into my mind was the Horsehead Nebula…one of the prettiest I think in the night sky….so I got to thinking (now you see how dangerous that can become) why not capture as many Zoo figures n the sky as I can.
Well to begin with think of the constellations that can be found in a Zoo…

Aries – The Ram
Apus – The Bird of Paradise
Aquila – The Eagle
Camelopardalis – The Giraffe
Canis Minor & Canis Major – The Dog ( ok maybe not in the zoo but could be)
Capricornus – The Sea Goat ( use your imagination)
Cetus – The Whale
Chameleon – The Chameleon
Columba – The Dove
Corvus – The Crow
Cygnus – The Swan
Delphinus – The Dolphin (Ok maybe an aquarium…but could be in a zoo
Dorado – The Swordfish (to play with the dolphin)

Equuleus – The Foal
Grus – The Crane
Hydrus – The Water Snake
Lacerta – The Lizard
Leo and Leo Minor – The Lion
Lepus – The Hare
Lupus – The Wolf
Lynx – The Lynx
Muska – The Fly – (most commonly found around most Zoo animals)
Pavo – The Peacock
Scorpius – The Scorpion
Serpens – The Serpent
Taurus – The Bull
Tucana – The Toucan
Ursa Major and Ursa Minor – The Bear
Volans – The Flying Fish
Vulpecula – The Fox.

Real nice Zoo! Then I thought of some of the beautiful deep sky objects that were named after animals, my favorite being the Horsehead Nebula, as seen in the photo at the beginning of this article. Here are some more pics I have taken of this heavenly Zoo….can you name the animal?

**1**

**2**

**3**

**4**

**5**

Hint – It is to the left and being chased by a lion!

For the answers tune in next issue!

# **Three Nights in October** by Mark Pickett

I went to Westfield Pioneer Village on Friday and Saturday at the end of October for Halloween Nights. I was the "astronomy person", with the telescope (a Peek'r Dob, 260mm, f6.6) and the observatory chair. I sent up in the square about 6:00 in the evening both nights. To my surprise, it was really cloudy both afternoons, but the clouds disappeared by 6:30 or 6:45, in time to start viewing. I estimate that 400 people looked though the scope at Jupiter on the two nights. The initial target was Jupiter with the four moons, and it was visible though a 65-degree 2-inch eyepiece that I had. It was spectacular.

Most people saw it all, and were really impressed with the detail. Some saw Jupiter and one or two moons. Some saw nothing at all, because the telescope moved on them. When the telescope moved, sometime it moved a lot, and I could correct it without any problem. There were only a few that missed Jupiter entirely out of 400 guests, so I was satisfied with the results.

The third night was Halloween, and it was the best night of the three. Unfortunately, only a few ghosts and goblins were out. The kids and the parents looked at Jupiter and other objects, but it wasn't the same without crowds of people. I think we had only about 20 people in total, not the same as Westfield with several hundred guests. Next year is a fresh start to do something different.

# A Long Overdue Eclipse…

Okay...how many people out there looked outside on the Monday evening, then checked the clear sky clock, concluded that there was no hope, and went to bed?

Myself, for one! I have a small excuse, though...I had to be up for work at 4:30am, and if I was going to watch the eclipse, I had to decide in the early evening, to make sure I got a few hours sleep. All indications were that this was going to be completely washed out. Further, Mark Kaye had sent me an email in response to one I'd send on the 17th, asking about a long range forecast: "Roger, you do not really want to know. Take it as a given that it will be cloudy and then, at least, there exists the small possibility that you can be pleasantly surprised…".

So, given everything, I went to bed at my normal time, and slept through one of the finer lunar eclipses seen recently. When I got up at 4:30, I went outside and took a couple of pictures of the Moon after totality.

If I'd stayed up to watch it, you can pretty much guarantee that it'd be cloudy. You're welcome!

Anyway, here's a sample of images from Colin Haig (left, top and bottom), Roger Hill (top right) and Ed Mizzi (bottom right).

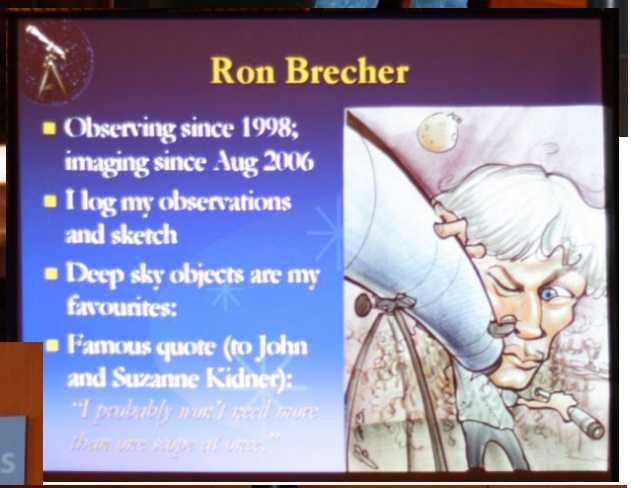
# The Year of the Comet

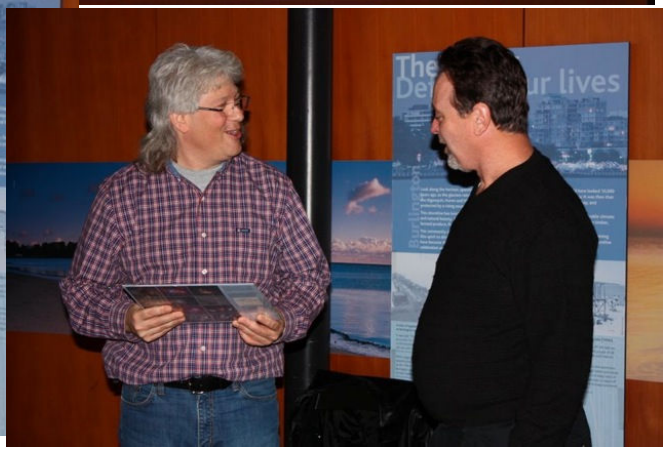
Appearing like a "blowtorch in the sky,"
It lit the night, and thus the naked eye
At that time had no trouble in discerning
What seemed for all the world to be a burning
Bit of heaven, a rending of the veil
Of the firmament, though in fact the tail,
Composed of meteoric dust and gas,
Held little to combust, so that it was
Merely one more reflection of sunlight
Arriving out of darkness to ignite
Quick imaginations of idle men,
Seventy-six years past, in 1910.
For some, the comet heralded an age
Of science, in which mankind would engage
Ultimate questions and prevail, in which
Technical advances would enrich
Our lives and a benighted populace,
As seeing means belief, rise to embrace
The light of reason lately come in view ;
For others, as belief is seeing, too,
The visitation meant apocalypse,
Wherein the comet's orbital ellipse
Had brought it back on an appointed round
To signal that the earth would soon be drowned
In blood, the seals be broken, the sky catch
Fire, that helpless sinners would soon watch
A hapless world destroyed and kingdom come,
For if the biblical millennium
Was winding down, then judgment day was due.
Well, we were ripe for change, that much was true,
And both persuasions, in a sense, have been
Vindicated, as modern medicine
Works new miracles to extend our years,
While modern warfare brings this vale of seers
To the point of prophecies that have gone
Before the wildest visions of St. John ;
Yet aren't they both evasions of the present,
Utopia and doom, predictions pleasant
Or otherwise, but easy answers to
The daily mix-ups we must muddle through ?
So men still mire in misery every day,
While earth still spins along its merry way,
Through days of bliss and seasons of distress
And eons of redundant emptiness.
The brightest memories occasioned by
Such hours pass in the twinkling of an I,
And once again the average life transpires
Amidst the sort of era that acquires
Historians but leaves the bard non-plussed,
Three quarters of a century that must
Like every other in its time, appear
to its inhabitants as the nadir
Of human kindness and the height of sense ;
Meanwhile, a dirty "snowball" circumvents
An end in space, accelerating through
Our solar system toward its rendezvous
With sunshine, with the spectacles of men,
And Halley's comet has come back again.
I went out to look for it late last night ;
You would have laughed to see me, for in light
Of nearby towns and in my ignorance
Of stars, I didn't stand a snowball's chance
In Dante's hottest hell, where lost souls sigh
Because they cannot see the night-time sky
.Oh, I may have seen something, I suppose,
An unimpressive squib of light that rose
In the southwest with Pegasus and might,
If it wasn't a plane, or satellite,
Or weather balloon, or simply a spot
On my binoculars, as like as not
Have been a comet ; that's the tale I plan
To tell the children of an aged man,
At any rate, how once, blazoned above,
Me, I beheld the very sign that wove
Its way into the Bayeaux tapestry
When, waiting on the tide of history,
Norman troops stood by the channel, how I
Witnessed the same sight seen by the Magi.
As Giotto pictured them in 1301,
Making their augured journey to the Son,
How light observed in Aristotle's time,
And subsequently hailed as the sublime
In the Philosopher's philosophy,
Has showered down its countenance on me,
Who have, I think, as much right as these
To light streaming like "long hair in the breeze,"
As the phrase goes whence "comet" is derived.
But truth to tell, what notions had survived
In me to the grave age of thirty-three
Of some grand cosmic continuity
Stretching across generations of men
And offering a type of order when
Life here on earth is at its most confused
Died in thirty seconds, and disabused
Of superstition, I went back inside
To soothe chagrin with thoughts that I had tried
To see it, that the world had grown too old
For auguries, and that my toes were cold.
Indoors, warming myself in the bright glow
And cold comfort cast by a picture show,
I switched the channel to the late-night news,
Where, among speeches, sports and interviews,
The audience was treated to the sight
Of footage filmed aboard a plane in flight,
Featuring what resembled a small comma
In space that punctuated the ring drama
Of its recurrence with a mild display
Of radiance enhanced by cathode ray ;
And so I saw the object after all,
If not first hand, then in a crystal ball,
The second sight of this dim century,
That dispiriting medium, TV.
I watched awhile and then shut off the set,
Stood up, let the dog in, and went to get
A drink before I let the cat out, locked
The house up and turned in ; the ice-cubes rocked
In my glass, clucking sympathy, while framed
Within a windowpane, tiny stars flamed
Enormously in the immense inane ;
It seemed whatever musings might explain
The disconcerting music of the spheres
Had ceased to matter much, as no one hears
Anything like harmony in the skies
And comets are snuffed out before our eyes.
Somewhere that misplaced punctuation mark
Awaited faint distinctions in the dark,
But I had vigils of my own to keep
And made my way upstairs and so to sleep.
Leaving the melting remnant of my drink
To come to nothing at the kitchen sink
And wishing other viewers more success
When the next comet comes from emptiness
(If it does come, if our poor atmosphere
Is not pure smog, if we are even here)
To set its blazing match-head to the straw
Of human intellect and then withdraw,
Wheeling around its perihelion
And disappearing with the tail it spun.

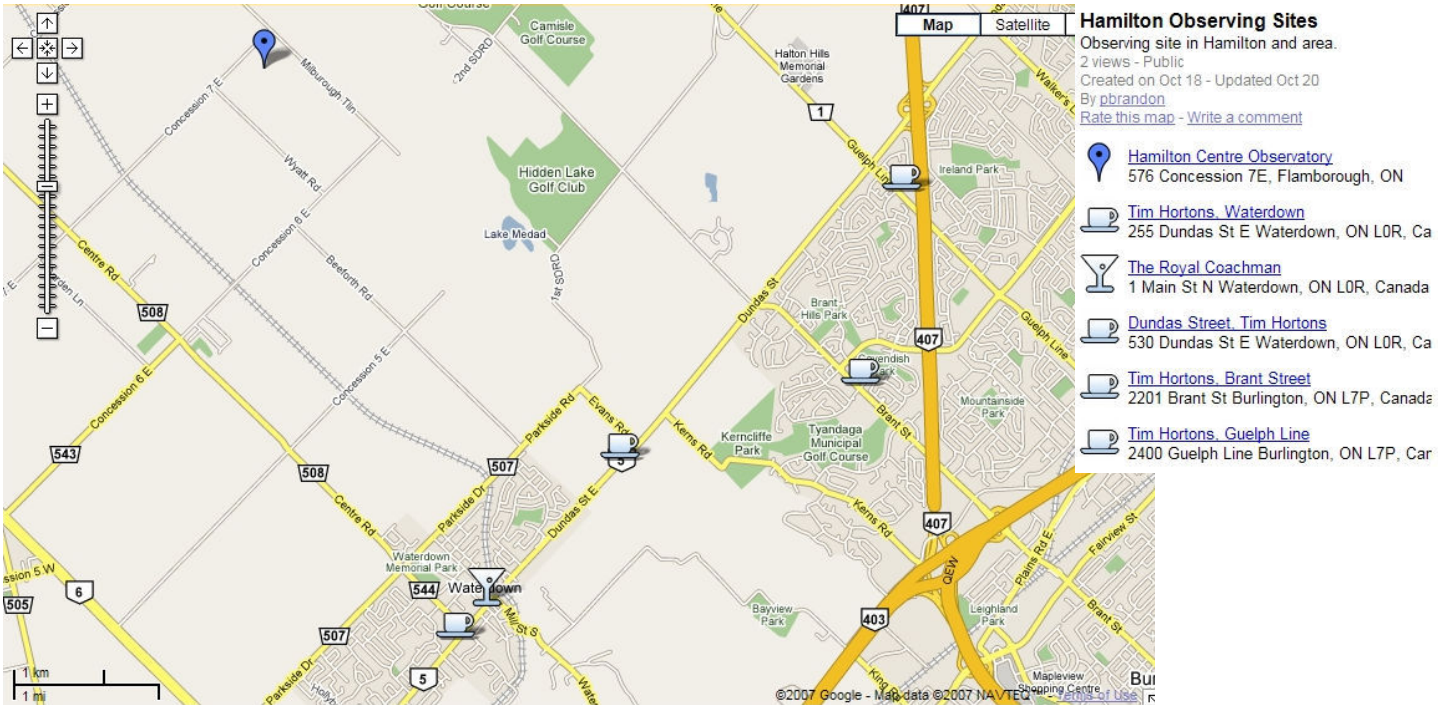
George Bradley,
*Of the Knowledge of Good and Evil* (1992)

# What you missed in December...!

December saw the (delayed) talk given by Ron Brecher. The night was filled with some great images, and no-one was left in any doubt that Ron knew his stuff. For people wanting to do more astrophotography, he certainly set the bar very high, ensuring that everyone knew that no matter how far you went, there is always more to learn and to master!



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What you Missed pictures by Ed Mizzi. Front cover photograph by Roger Hill

**Don’t forget, our meetings from January to June (except February) will be held at the Royal Canadian Legion, 79 Hamilton Road in Waterdown.**


*The RASC Hamilton Centre cordially invites you, your family and friends to attend an evening at the David Dunlap Observatory*

Just think, if it's clear you may get a chance to view M42 through a 74" telescope...wow!

Saturday, February 5, 2010
7:00 PM
Note: This replaces our Thursday meeting

$10 per person

RSVP to reserve seats (space is limited)

Directions will follow