

Orbit

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Hamilton Centre of the
Royal Astronomical Society of Canada
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Issue Number 9, September, 2011

Roger Hill, Editor

I have, in my time on this Earth, been privileged to witness some astonishing things. Some were simple, like the Milky Way over the Atacama Desert, some were more complex like three total solar eclipses. I added another one to my list over the summer: a Manned launch. I'll give some more details further inside the pages of Orbit, and you'll have a chance to see other pictures and video at the September meeting, but allow me to digress a touch here.

From the mid '60's, I've been hooked on spaceflight. I'm not sure whether spaceflight fuelled my love of astronomy, or vice versa. Like a lot of amateur astronomers who came of age in the years up to, and including, the Moon landings, our species first faltering steps above the atmosphere held us spellbound. The Moon, rather than being a light in the sky, became a place for the first time. Mars went from Barsoom to Luna with the arrival of Mariner 4, while Venus went from a sweltering moist dinosaur-laden swamp to a pretty good approximation of Hell.

And so it was when I first joined the Hamilton Centre in 1970. Also a member at the time was Ken Chilton, and in many ways I was most fortunate in that he was very much a mentor to me. He organized occultation trips, driving to Burlington to pick me and Wayne McPhail up. He took me down to Toledo, Ohio for a weekend where I got to hear, and meet, Bart Bok (he of Bok Globules fame). He drove me (and a couple of others) to a G.A. in Ottawa in 1973, as well as to the Syracuse Summer Seminar.

And so it was, by 1972, that the US cancelled Apollo's 18, 19, and 20, leaving Apollo 17 as the last in the series. By this time, Ken had established his cable TV show The Sky Tonight and syndicated it across a number of cable systems in Canada. Much to my dismay, it was not shown in Burlington, which was a shame as I had appeared on it several times. Anyway, I got a call saying that Ken had managed to wangle a press pass for two people—him and a cameraman. He offered me the job of cameraman.

For what, at the time, seemed like good and valid reasons, I did not go. My parents were against it, and while I put up a spirited defence, the phrase I remember most was “after all, there'll be plenty of other Moon launches”.

For the last few years, I've been trying to arrange a trip down to Florida to see a Shuttle launch, when it became obvious that there would be a point when there'd be no more. Plans were made, and shelved several times, as my circumstances changed. Contracting ones services is tough...when you're not working you can't afford it, and when you are, you're loathe to take the time off. And even when things seem to be nicely balanced there was either no flight scheduled, or it was delayed...sometimes for weeks and months. At least this allowed me to go to the Texas Star Party in 2007, as well as to take my wife to Arizona for a week.

Last year, it looked like my son and I were finally going to make it. We were going to drive down with a very good friend of mine and his girlfriend. We'd have three drivers, and we reckoned on driving straight there and back again. We'd stop in Washington DC on the way home to go see the Apollo 11 command module, the Wright Flyer, the Spirit of St. Louis, etc.

By now you'll have guessed that we didn't make it. The reason being that my mother-in-law passed away. Jamie and his girlfriend made it. They found a spot in Titusville that was free of the usual crowds, watched the launch, and drove home. The only major problem was that Jamie borrowed his daughters Canon Digital Rebel (300d), but didn't realize that it would take pictures WITHOUT the memory card in. To say he was crushed would be like saying that WWII was a minor skirmish. It was not the first time that he'd had problems with the camera...when we went to see Buzz Aldrin give a talk a few years ago, he didn't know that his daughter had not re-charged the batteries and he showed up with a dead camera.

Anyway, as you can judge by the front cover, I was successful, and a more complete account of the journey can be found further inside.

With it being September, our annual Members night is being held, and I'm expecting to see some spectacular images. I know several of the guys on the Board have been busy..I've seen some great pictures from Gary Colwell, and some very good ones from Ed Mizzi. Mark Pickett has been busy working with the re-located Marsh Telescope, as well as attending, via phone, the National Council meetings at the GA in Winnipeg this past July. Andy Blanchard has been busy planning his next trip to Chile, and rumours persist that (again) he won't be the only Board member heading south of the equator in September...after all we have a pair of Gary's on the board, and only one of them has been to the Atacama!

It seems to me that the most active people are also on the Board (either Hamilton's or National's).

Which leads me to my next point. I've been doing Orbit now for four years, and I've been President for three. I'm going to be stepping down from one of them, and having been President now on two separate occasions, totalling almost 6 years, that's the position I've decided to relinquish. I'll stay on the Board, as most Presidents are almost honour bound to sit as "Past President", helping out the new occupant wherever possible. However, I've really come to enjoy putting Orbit together, and I'm not really tired of doing it. Oh, some months it can be a bit of a struggle trying to find content or cajole people to submit stuff, but for the most part it's an enjoyable dozen hours or so every month. The only real downside is that it always seems to be clear outside when I'm putting it together. C'est la vie.

This means that after the October Annual General Meeting that there'll be someone new gracing the pages of orbit every month (or rather, there'd better be!) in a "From the Keyboard of the President" sort of column. I'm not sure who will step forward...the only real qualifications are that you must be a paid up member of the Society, and have served on the Board for at least a year, although it does not have to be the previous year. This means we have literally dozens of people who could easily do a much better job than I've done.

We could also sue some more fresh blood on the Board. It's been great having Ed and Gary B. On this year...their enthusiasm has been infectious...in fact it's tough at times to stop Ed from volunteering for everything in sight!

However, just like last year when we said we could do more if we had more on the Board, the same remains true this year. The qualifications for being on the Board are simpler than for being president...you must be a paid-up member of the Centre and have been for at least one year prior to joining the Board...again, it doesn't have to be the previous year.

We've got a good group on the Board at the moment, but we could use a few more. We have a fair bit of fun, and while the Board meetings can occasionally be a bit tedious, it is only for a few minutes, and then a joke will be cracked and we'll veer merrily off-course, have a few laughs and then try to get back to business. Normally, we're successful at it, too, but not always. What's also not unusual is for an observing session to break out after the meetings. This is particularly good, as you get a chance to use the big scope and see what's been done to it before anyone else.

So...here's what we need: A few people with a few hours per month. No particular skills are required...virtually no matter what you do, or what you like, we can find something to suit your particular talents.

So...that's all for this month,

Clear skies, one and all,

Roger Hill
Orbit editor and President.

The Last Launch

As I wrote earlier, I'd been trying to get to see a manned launch since 1972. I'd had a couple of chances, but something always seemed to come up to stop me. The launch of Atlantis, STS-135, the final one, would be the last chance. Considering that I'd missed my chance to see Apollo 17, there was no doubt that I had to take my son with me.

Last year, we watched as the normal shuttle flights were running down. Atlantis' final flight was supposed to have been STS132, in May 2010, but it had to be ready to act as a rescue mission for the final flights of Endeavour and Discovery. This meant a fully complete and ready to go space shuttle...engines done, tank ready, solid rocket boosters primed. NASA was able to convince the powers that be, the ones with the money, that it would be next to criminal NOT to use Atlantis to take up all the spare parts, fuel, water, food and other consumables with a minimal crew of four. If something went wrong, and Atlantis was unable to return safely from orbit, then the astronauts could be brought back in a pair of Soyuz capsules after spending time safely at the ISS.

The money people bought the argument, and STS-135, the final flight, was penciled in to the schedule for the middle of June, and I booked my vacation accordingly.

By the time everything was settled, the flight was delayed by a couple of weeks, and launch date was set for Friday July 8th, 2011, about 11:30 in the morning. I re-scheduled my vacation, no problem, and we were set. In fact, given my crazy work hours, this was a much better time for the launch. My son and I could leave on Saturday, July 2nd and I didn't have to be back at work until Tuesday July 12, and I only had to use a week of vacation to do it.

In a bit of good fortune, my wife had a convention that she could attend in Orlando that started on Friday, July 8th and ended on the Sunday. This was great as it meant that there were two drivers in the car, allowing us to go for many hours. It allowed us to leave Orlando on the Sunday afternoon, and make it back to Milton Monday evening. Since it's about 20 to 22 hours of driving from Orlando to Milton, we'd even be able to grab a few hours sleep on the way, have a shower, get back on the road and still arrive back about midnight Monday night. Luxury!

Like I'd originally planned with Jamie, we decided that this trip should be a bit more than just a visit to Florida with (hopefully) a launch thrown in. We made the decision to travel down the eastern seaboard, stopping in Philadelphia to visit the Liberty Bell and Independence Hall. Anna has a good friend in Washington, so we could stay there for a couple of days, too. Jonathan really liked that idea, because he's livid in the shadow of his sister for quite a while. She'd been to France in 2004 to stay with my brother and his wife while looking after her two cousins as a sort of summer camp counselor. So, for six weeks, she got to live in Paris, and then tour France (down to Avignon on the TGV!) with the family for a week.. So, every time we watched a movie that had a scene in Paris, the inevitable "I've been there" would be heard. Last year, she went to New York City for the weekend, and was making the same sorts of sounds about The Big Apple, too...it was driving Jonathan crazy, as he was not able to say that about any place where he'd been that she hadn't.

So, a trip to Philly and DC would rectify that!

At the end of May, I put my name forward in the lottery to get hold of Cape Canaveral Causeway tickets. Along with tens of thousands of others, for just a couple of thousand places. The causeway is the best place for the general public to watch a launch. It's six miles away, and you can see the launch tower across the water, and the shuttle has it's back to you, so you see it silhouetted against the orange fuel tank. The media get to be closer, and there are VIP seats for former astronauts, politicians and the like, and for some NASA employees, there's a view spot on top of the Vehicle Assembly building. I'd tried to get up there, but the one guy my son knew who worked there was never able to get us tickets.

The park in Titusville is perhaps the best free viewing site, but at 12 miles away, almost double that of the NASA causeway location, it seemed to me to be worthwhile to try to view from there.

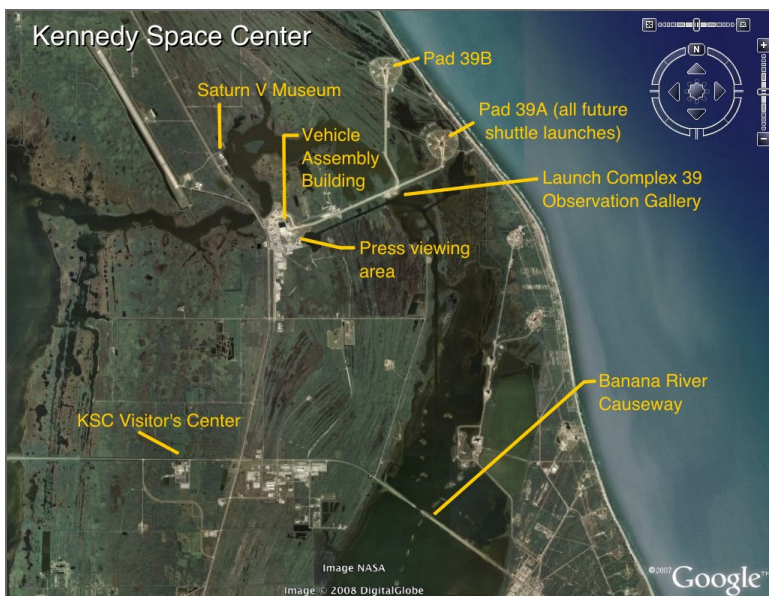
Unfortunately, I was unsuccessful. So, we decided that Titusville would be our destination. We booked hotels in Orlando and got an excellent price for a Holiday Inn resort for two nights. And then, while doing further research about the best spots and how far ahead of time we'd need to get there, I found out about the Bus lines in Florida that partner with NASA to offer launch viewing from the Causeway. During one of my days off, Gray Bus line in Orlando would be offering up tickets to the Causeway, including Bus ride from Orlando to the Cape and back, admission to the Kennedy Space Center, Causeway tickets and, should the launch be delayed, the ability to sign up for another chance to see the launch. At \$180 a person, it wasn't exactly cheap, but what the heck...it was the last launch.

So, on the appointed day, my son and I lined up our respective laptops and smart phones. I using Windows 7 and an iPhone 3, he using a Macbook and an iPhone4. The website said that registration would be possible from 1200, EST, but they really meant 1200 EDT. 15 minutes before the appointed hour, Jonathan and I commenced our assault on their server. We weren't the only ones...when the website opened up to purchase tickets at precisely noon, it promptly crashed. The refresh keys of our respective browsers were worn away, and several times we held our breaths as it looked like we'd gotten in. Finally, about 12:45, we were able to get my name in, and request three tickets, which they confirmed were now in our "shopping cart"! Cue loud cheers, and then more pounding on keyboards as we nervously tried to get the site to accept my credit card. It took another half an hour, but at 1:15 pm, we got confirmation that the site had accepted payment. We printed that out. On two different printers. And kept screen prints. On two different computers. We were taking NO chances! Email confirmation arrived a couple of hours later. The only thing we had to worry about was that the actual tickets would be arriving via US Postal Service. And Canada Post was about to go on strike!

It was a nervous three week wait during the strike, and the Bus line assured us that if worse came to worst, they'd hang on to them and we could pick them up at their office in Orlando. So, I dialed back my panic, and waited. Two weeks before the launch, we got notification that our precious package containing the tickets had left Florida on a Friday morning, and sure enough, arrived on our doorstep on the Monday. It's said that there's still many a slip 'twixt the cup and the lip, but seeing the tickets was a really sweet moment.

The next issue was what to take. Do I take a telescope and if so, which one? Do I take my Williams Optics ZenithStar 80mm? Do I take my 6" Ritchey Chretien? Or do I just take a telephoto lens? In the end, I decided to just take a 70-300mm Canon zoom lens. I'd bought it in St. Thomas, US Virgin Islands, at a duty free store, and while it was quite good, it was never sharp enough for astrophotography, so I sold it to my daughter, who was looking for a good general purpose zoom, which it was. I borrowed it from her for the trip. I had to work on July 1st, so bright and early on July 2nd, my son and I started packing the Kia Soul for the trip. We'd got a car top carrier bag to hold the luggage so we could stretch out and sleep in the back seat, but it wouldn't hold what we needed it too, and I was worried about it scratching the roof of the car. The Kia has two roof-rack bars on top, so we dragged out an old solid plastic car top carrier we still had from an earlier trip to Florida, but we couldn't tie it down properly. Off we went to Canadian Tire (again), and bought a couple of tie down bars. These ran from side to side and we mounted the big plastic carrier on top of them. Using tie-down straps, it seemed very secure, but we vowed to check it every stop. By the time we got everything in to the Kia, we were about several hours late, which meant that we probably wouldn't make Philadelphia that night (8 to 9 hours, without any wait at the border). With the address of Independence Hall loaded in to the GPS, we set off.

The stop at the border to inspect my passport took a little longer than usual (won't use the Rainbow Bridge again). Somehow, the directions we got didn't really jibe with what I knew about the direction that Philadelphia lay in from



Buffalo so overriding the GPS just got us in worse trouble. Finally, I decided to trust Amy (named after the GPS Les and I used to get to the Texas Star Party, which was named for Amelia Earhart, with the side benefit of sounding like "Aim Me"), who took us toward Albany. We got off the toll road in Syracuse, and in the dark drove down Hwy 81 toward Scranton. We didn't make it, instead finding a hotel in Binghamton.

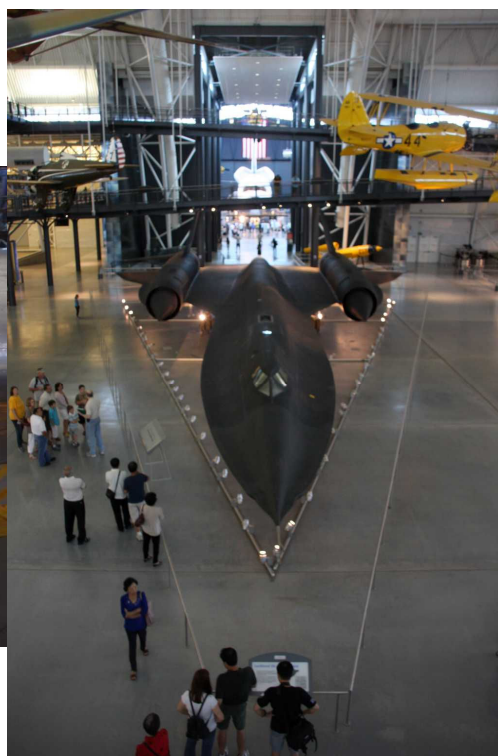
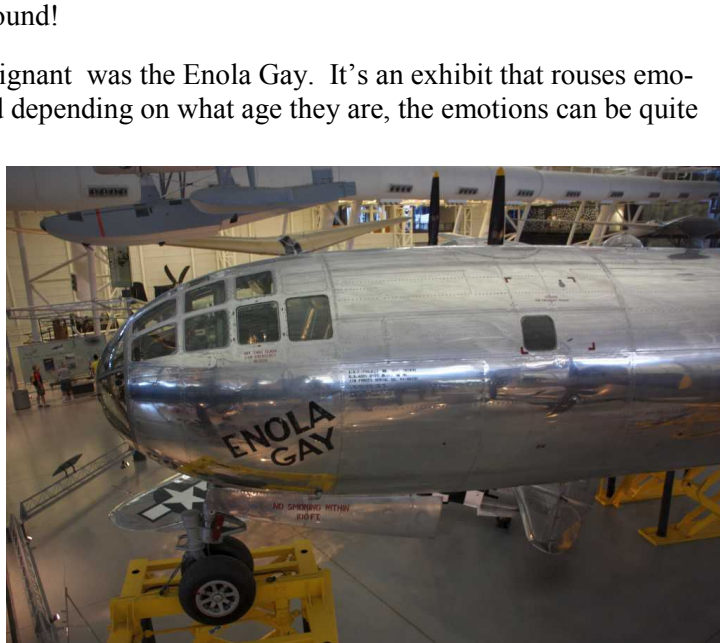
Bright and early, we set off in the rain toward Philly, arriving late morning. We were due in DC that evening, but since it was less than three hours away, we weren't worried. We got in line to look at the Liberty Bell, and I found out why my camera had been causing me problems...the lens would not stop down. As long as I used it in Aperture Priority mode, I was OK. We managed to get in to see the draft copy of the Declaration of Independence they have, and I asked the US Park Ranger (Independence hall is a National Park, so the people in there are Park Rangers, apparently) all sorts of questions. I let him know that I was English, so he would not assume that I had fallen asleep during Civics class (I guessed from the accent was his droll reply!). He said that the Declaration itself was just a litany of complaints that the colonists had against the Crown. I told him "We don't do that anymore...you're welcome back, you know!" He had a good laugh, and I learned a LOT about what happened...it was fascinating.

After a Philly Cheese Steak sandwich, off we went for the (relatively) short drive to Washington. Being warned that downtown Washington would be a complete nightmare on July 4th, we opted for the National Air and Space Museum near Dulles airport. Wow...what a seriously cool place THAT is! Even my wife, not a huge fan of aerospace at the best of times. They have an SR-71 Blackbird there, and you can see how close you can get to it...to say nothing of Enter-prise in the background!

One of the most poignant was the Enola Gay. It's an exhibit that rouses emotions in people, and depending on what age they are, the emotions can be quite different. There is a plastic shield near the front of it to stop people from spitting on it.

It was a fun day, and perhaps because the temperature outside was pushing 100F and very humid, a most welcome one.

We went out that evening and watched some fireworks at the town just north of the city, and on July 5th, we went in to the City proper.



Our biggest problem was that virtually all the parking was of the underground variety, and with the car-top carrier, we didn't fit. We ended up in a small outside lot in Georgetown and took a taxi back. We saw most of the sights, the White House, the Capitol, the Washington, Jefferson and Lincoln memorials and I insisted on going in to the National Archives to see the signed Declaration of Independence, the Bill of Rights, and the original US Constitution. We even saw the Google Streetview Car, but we haven't spotted ourselves yet! After supper, we were on our way again...heading south. My son mentioned that he was just sorry that we hadn't seen the Pentagon, and as we drove across the Potomac, we went right past it! Mission Accomplished!! We stopped for the night in North Carolina and on the afternoon of July 6th, we arrived in Orlando. The launch was in two days.

One problem that had occurred was that outside the White House, my main lens, an 18-125mm Sigma, stopped zooming.

I spent a good chunk of July 7th wandering around camera stores and finally bought a Tamron 18-200mm Zoom that was on sale at a very good price, and a \$60 mail in rebate. I'm looking forward to trying it for astrophotography, but I doubt that it will be as good as the lens it replaced. We also found Crossroads Plaza, where we'd be picked up by the bus that would take us to the Cape.

We got up at midnight, showered and re-packed the car (we'd be changing hotels after the launch), making it to Cross-Roads just before 2am. There were about 20 buses there and hundreds of people. We got on our bus, luckily sat near the front and promptly made the acquaintance of the people around us. There were people on the bus that had come from farther away than us (Tokyo and Sydney, Australia), but no one who'd driven farther. Our guide, Linda, was great. Around 4am, we pulled in to the Kennedy Space Flight Center. There, we had to get out of the bus and then, about two hours later, after they'd been thoroughly checked out by Security, we could get back on. This was far easier said than done.

The gift shop was complete bedlam, with all sorts of special merchandise to indicate that you were there for the Grand Finale. Things were taking far longer than they'd planned, and as day broke, we were hugely concerned about the weather. Despite everything, though, we were finally on the Causeway by about 9:30, two hours before the scheduled launch, along with tens of thousands of other people. There had to be 300 buses lined up nose to tail, three deep.



The closer we got to launch, the better the weather became, and by 11am, the normal high temperatures and oppressive Florida humidity were returning. NASA had provided public address type speakers along the causeway, and if you concentrated, you could actually make out the audio! At about the same time we heard that the weather had cleared sufficiently for the Launch.

There was a planned “hold” in the countdown at the T-20 minute mark, that they came out of a touch late, but there was no delay...they used a little less time in the “hold” at the T-9 minute mark. A NASA helicopter flew by...someone inside taking video of the crowd. Bit by bit the carnival atmosphere was disappearing and a tense air of expectation was settling on the Causeway.

Less than a minute to go, and you could cut the tension with a knife until the unthinkable happened...with 31 seconds to go, just before control was handed off to the shuttle, they stopped the countdown. It seemed that there was an indication that the “Beanie Cap” that keeps the liquid oxygen topped up had NOT retracted. We waited while we heard a request for a camera to confirm that it had properly retracted. They could have asked ME...I could SEE that it was! The causeway was completely silent...you could hear the wind blow. I heard



someone tell the CapCom “Press on”, and after a few more seconds, the count resumed.





It's an astonishing sight...it seems to crawl up the launch tower, dragging itself into the sky...impossibly getting faster and faster. What surprised me was how intensely bright it was. As it vanished into the clouds, and re-appeared for a few seconds, people stood, thunderstruck...and then came the sound. We were unlucky that the wind was in the wrong direction, so we didn't get the feeling we were being squeezed. It merely sounded like the very air was being ripped apart. All too soon, we heard MECO—main engine cut-off, and Atlantis was in orbit.

Getting home was another adventure, as was two more trips to the area, but I'll save those tales for another time, or over a beverage at the Royal Coachman.



History of the Night

Jorge Luis Borges

Throughout the course of the generations
men constructed the night.
At first she was blindness ;
thorns raking bare feet,
fear of wolves.
We shall never know who forged the word
for the interval of shadow
dividing the two twilights ;
we shall never know in what age it came to mean
the starry hours.
Others created the myth.
They made her the mother of the unruffled Fates
that spin our destiny,
they sacrificed black ewes to her, and the cock
who crows his own death.
The Chaldeans assigned to her twelve houses ;
to Zeno, infinite words.
She took shape from Latin hexameters
and the terror of Pascal.
Luis de Leon saw in her the homeland
of his stricken soul.
Now we feel her to be inexhaustible
like an ancient wine
and no one can gaze on her without vertigo
and time has charged her with eternity.

Jorge Luis Borges

E Pur Si Muove—

George Bradley

Of course it had been madness even to bring it up,
Sheer madness, like the sighting of sea serpents
Or the discovery of strange lights in the sky ;

And plainly it had been worse than madness to insist,
To devote entire treatises and a lifetime to the subject,
To a thing of great implication but no immediate use,
A thing that could not be conceived without study,
Without years of training and the aid of instruments,
And especially the instrument of an open mind ;

It had been stubbornness, foolishness, you see that now,
And so when the time comes you are ready to acquiesce,
When you have had your say, told the truth one last time,
You are ready to give the matter over and say no more.

When the time comes, you will take back your words,
But not because you fear the consequences of refusal
(Who looks into the night sky and imagines a new order
Has already seen the instruments of torture many times),
Though this is the conclusion your inquisitors will draw
And it is true you are not a brave man ;

And not because you are made indifferent in your contempt
(You take their point, agree with it even, that there is
Nothing so dangerous as a new way of seeing the world) ;

Rather, you accept the conditions lightly, the recantation,
Lightly you accept their offer of a villa with a view,
Because you have grown old and contention makes you weary,
Because you like the idea of raising vines and tomatoes,
And because, whatever you might have said or suffered,
It is in motion still, cutting a great arc through nothingness,
Sweeping through space according to a design so grand
It remains, just as they would have it, a matter of faith,
Because, whether you say yea, whether you say nay,
Nevertheless it moves.

What you missed in June...!

June was DarkFest...a “Summit”, if you will, on light pollution. We had visitors from four other Centres, as well as our main speaker from the Peterborough Astronomical Association, and even a representative of the Hamilton-Wentworth government, as they’re looking at creating an Urban Dark Sky Park. It must have worked, as the Board created a Light Pollution Abatement Committee. At the very next Board meeting.

First off, though, was Glenn Kukkola, who displayed yet another in a long list of useful telescope aids he has created and built over the years. A neat gadget to carry counterweights was the highlight!

Various people were invited to talk about their experiences in fighting Light Pollution before our main speaker, Mark Coady, got going. For instance, Peter Hiscock from the Toronto Centre brought along a grad student from York who has created an iPhone app that uses the camera from the phone, as well as its GPS, to help map light pollution. She hopes to get the App into Apples App Store sometime soon. Steve Holmes, of the K-W Centre told us about a large success he’d had.

Mark Coady was well worth listening to, and hopefully our LPA Committee, and that of the Hamilton Amateur Astronomers, will work with Mike Fields from Hamilton-Wentworth.



Wow!!

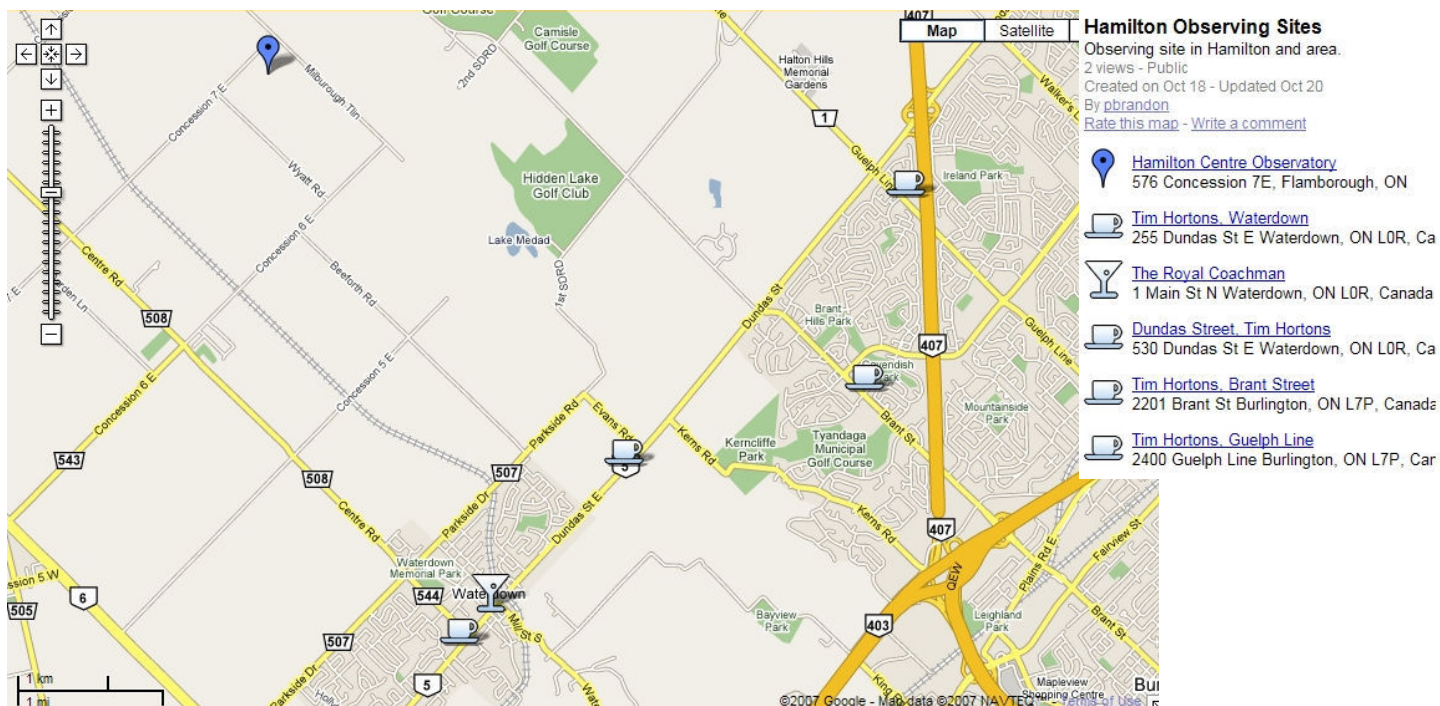
Sometimes, someone goes so far above and beyond the call of duty, that I have to add a page in Orbit to celebrate it.

So it is, this month, with Mark Pickett.

Mark has been working with Westfield Village, providing a home for our antique telescopes. It's a project that has taken a fair bit of time in the last couple of years, but it's a done deal. Westfield will be the home for the Marsh Telescope (Mount and Optical Tube Assembly) and the Bell Telescope. The arrangement is that they will store and house the scopes in proper conditions—humidity and temperature—and when we do a public night, or assist with an event at Westfield, that they'll bring the telescopes out of storage. We'll be providing expertise on the night sky, as well as some history of the Reverend Marsh. The term is for one year, renewable by both parties on the anniversary. It's a great arrangement, as we keep the scopes, and they store them for us in exchange for public nights when they are open during dark hours.

To assist in this, Mark recently went to Westfield's Ghost Nights and showed off the Moon. The Bell scope was placed on the Marsh mount for reasons currently unknown (but will be revealed!).





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What you Missed pictures by Ed Mizzi. Front page image by Roger Hill. Back page: M20 by Ed Mizzi.

Meetings are on the first Thursday of every month except July and August, upstairs at the Royal Canadian Legion, 79 Hamilton Street in Waterdown. Start time is 8pm.

September 1st: Members Night

October 1st: FRIDAY! Return to the DDO in Richmond Hill

October 6th: Annual General Meeting at the Observatory



NOMINATION FORM for the Board of Directors - October, 2011.

I, _____, being a member in good standing of the Royal Astronomical Society of Canada 1968, Hamilton Centre, do hereby nominate _____ for election at the Annual Meeting.

Signature of nominator and Date - 2011/MM/DD

I, _____, being a member in good standing of the Royal Astronomical Society of Canada 1968, Hamilton Centre and being at least 18 years of age, do hereby accept my nomination to the Board of Directors of the Royal Astronomical Society of Canada 1968, Hamilton Centre.

Signature of nominee Date and 2011/MM/DD

NOMINATION FORM for National Council Representative - October, 2011.

I, _____, being a member in good standing of the Royal Astronomical Society of Canada, and of the Hamilton Centre, and being at least 21 years of age, do hereby accept my nomination for National Council Representative for the Royal Astronomical Society of Canada 1968, Hamilton Centre.
(Two year term)

Signature of nominee and Date—2011/MM/DD

Bylaw Number One of The Royal Astronomical Society of Canada 1968, Hamilton Centre (September 13, 2005)

5.04 NOMINATIONS

Any member of the Centre may make nominations to the Board. Such nominations shall be submitted by the member to the Secretary of the Centre in writing at least ten (10) days before the annual meeting, and shall contain the name of the nominator and the written consent to the nomination by the nominee.

Bylaw Number One of The Royal Astronomical Society of Canada (February 2006)

4.07 CENTRE COUNCILS AND OFFICERS

- (2) Every member of the Centre Council shall be elected by the members of the Centre, for such term and in accordance with such procedure as is established by the Centre by-laws, at the Centre's annual meeting or at such other meeting as is duly called for that purpose.

4.08 NATIONAL COUNCIL REPRESENTATIVES

- (2) Subject to Article 4.08(4), the National Council Representatives of a Centre shall be elected by the members of the Centre in accordance with the procedure established in Article 4.07(2) for the election of Centre Council members.

- (4) If for any reason a National Council Representative of a Centre is unable to attend a meeting of the National Council, then the Council of the Centre may appoint another member of the Centre as an alternate for that National Council Representative. The alternate will be entitled to exercise all the rights of the National Council Representative for whom he or she is the alternate only upon presentation to the National Council of proof in writing from the President or Secretary of the Centre as to the due appointment of the alternate.