



Upcoming Meetings

Friday, March 12, 2010
Members' Night 7:30-9:30 p.m.

Friday, April 9, 2010
Regular Meeting 7:30-9:30 p.m.

Friday, May 14, 2010
Regular Meeting 7:30-9:30 p.m.

Meetings are held at 7:30 p.m. at Stirling Hall Theatre "A" on Bader Lane at Queen's University in Kingston, Ontario. Our meetings are co-sponsored by the Queen's Physics Department and include astronomy lectures open to the public. ★



KAON Public Observing

Saturday, March 13 7:30 p.m.

KAON (Kingston Astronomy Outreach Network) sessions are held at Queen's Observatory on the 4th floor of Ellis Hall.

Astronomy Day

Saturday, April 24 ?7:30 p.m.. ★

More info at kingston.rasc.ca

Globe at Night Kim Hay

THERE IS A PROGRAM that is run every year at this time, to help determine the light pollution in your area. No special equipment is needed, just a clear night and a few minutes look to the constellation Orion between 8 and 10 p.m. local time. Just count the number of stars that you see, go to the website at globeatnight.org, and input the count of the number of stars you saw and this gives you an idea of how bad or good your skies are. After the event a map will be displayed on the counts throughout the world. The program runs from March 3 to 16, 2010. ★



The Southern Pinwheel Galaxy, Messier 33

This image was taken by **Brian McGaffney** on 2009 March 28 from the dark sky area in Hastings at **Nutwood Observatory**. You can see more of Brian's images at nutwood-observatory.com

New 'Alien' Invaders Found in Milky Way

Friday February 26, 2010

KINGSTON, ON - As many as one quarter of the star clusters in our Milky Way—many more than previously thought—are invaders from other galaxies, according to a new study. The report also suggests there may be as many as six dwarf galaxies yet to be discovered within the Milky Way rather than the two that were previously confirmed.

"Some of the stars and star clusters you see when you look into space at night are aliens from another galaxy, just not the green-skinned type you find in a Hollywood movie. These 'alien' star clusters that have made their way into our galaxy over the last few billion years," says Terry Bridges, an astronomer at Queen's University in Kingston, Ontario.

The study (co-authored by Duncan Forbes of Swinburne

Continues on page 7...

In this issue:

- | | | |
|--------------------------------------|-------------------------------------|---------------------------------------|
| ▶ Images from Pup & CMa 2 | ▶ Compendium of Esoteric Facts . 4 | ▶ Images: M50, NGC 3293 6 |
| ▶ News & Reports 3 | ▶ Blast from the Past 4 | ▶ Meeting Report: February 12 . . 7 |
| ▶ KC 2009 Financial Report 3 | ▶ Observing Reports: February . . 5 | ▶ KC Meteorite Collection 8 |

Images from Puppis & Canis Major

Currently well-placed in the evening sky (about 12° east of Sirius), the open cluster Messier 46 comes with a nice bonus: planetary nebula NGC 2438. Also, cluster M47 is just 1° away.

Images: slooh.com



Below: M41 in Canis Major is one of the showpieces of the winter sky. Just hop 4° due south from Sirius.



Below: NGC 2477 in Puppis is only about 6½° up at transit so you need a dark sky and a very low horizon!



Regulus Needs You!

Items of interest from members—full articles, or even just a couple of paragraphs are always welcome. Items are gratefully accepted on each and every day of the year! Send items to:

walter2 (at) starlightccd (dot) com

or:

Walter MacDonald
PO Box 142
Winchester ON K0C 2K0

The Fine Print:

Members of the Kingston Centre receive *Regulus* as a benefit of membership. Non-commercial advertisements are free to members of the Centre. Paid commercial advertising is also welcome and should be in electronic format.

Submitted material may be edited for brevity or clarity. © 2010, all rights reserved. Permission is granted to other publications of a similar nature to print material from *Regulus* provided that credit is given to the author and to *Regulus*. We would appreciate you letting us know if you do use material published in *Regulus*.★



RASC-KC Board of Directors

President:	Susan Gagnon
Vice President:	<i>vacant</i>
Secretary:	Steve Hart
Treasurer:	Kevin Kell
Librarian:	David Maguire
Editor:	Walter MacDonald
National Council Rep:	Brian Hunter

2009-10 Committee Chairs/Coordinators

Equipment Loan:	Kevin Kell
KAON:	Susan Gagnon
Webmaster:	Walter MacDonald

RASC Kingston Centre
PO Box 1793
Kingston ON K7L 5J6

E-mail:
kingston@rasc.ca

Website:
kingston.rasc.ca

News & Reports

The Character of Physical Law

Microsoft has purchased the rights to the BBC TV series of **Richard Feynman**'s lectures given at Cornell University in 1964. There are seven lectures of almost one hour each and they should be required viewing for everyone! Don't worry: these lectures are accessible to everyone—you don't need a physics degree to follow them! The lectures can be viewed at:

research.microsoft.com/apps/tools/tuva/index.html

A Canadian in Chile

Many of us have fantasized at one time or another about moving to a remote dark-sky site to live there and do tons of observing. One RASC member has actually done this: **Les Nagy** of the Hamilton Centre. Now you can live the dream vicariously at Les' blog: <http://lesnagy.ca/>

ARO is a "Twittering" Fool

Dave Lane reports: Many of you know that I observe variable stars in an automated way with my backyard observatory on most clear nights.

Recently, I added a new feature to the software whereby the observatory (ARO) updates its status on Twitter in real-time as it "does its thing." The updates are written as if the observatory is "talking."

While I did this mainly for the fun of it, it does make it easy for me to monitor what's going on when I'm not home, by using my phone with the Twitter application (much better than endless emails).

twitter.com/AbbeyRidgeObs

KC Council Meeting

The Centre's council met on Sunday, February 7th. This happens several times each year, but what made this meeting notable was its use of technology. Of the six council members, four were physically present at Queen's University while two attended via the Internet

KC Financial Report for 2008-9

Kevin Kell, Treasurer

Summarized by Kevin Kell (Treasurer 2010-2011) from the highly detailed QuickBooks Pro report available on the Centre's website at:

<http://kingston.rasc.ca/Secure/AnnualReports/2009.php>

Annual Financial Report of the RASC-Kingston Centre as presented by Kim Hay, Treasurer 2008-2009 and adopted by the Board of Directors (Nov 2009) and the Annual General Meeting (Nov 2009) and audited by Brian Hunter.

Income

Membership Fees	\$2207.73
Donations	317.00
Fundraising	228.50
Interest	203.06
Advertising	120.00
Promotional Item Sales	-171.82
KC Promo Item Sales	56.00
Fall'N'Stars	944.00
Cost of Goods	-10.08
Total Income	\$3894.39

Fund Allocation as at 2009 Oct. 1

Fall'N'Stars	\$927.75
Observatory	12951.05
Reserve	500.00
Special Projects	1500.00
General Operating	5803.71
Funds Total	\$21682.51

Notes:

- Our membership fees comprised \$2207/3894 or 57% of our income in 2009, compared to 34% in 2007 and 30% in 2006.
- Of the \$72 Regular membership fee, the Centre receives \$28

telephony software Skype: **Walter MacDonald** was in Winchester, Ontario, **Brian Hunter** was in London, England. In addition to the Skype connection, **Kevin Kell** was able to stream live video from the meeting room (Skype operates in audio-only mode when three or more people are connected). Attendees generally agreed that the technology had worked very well. Certainly it proved its value in allowing out-of-town members to "attend" council meetings, thereby helping to keep Kingston Centre going.

Expenses

RASC Inventory	\$599.48
General Expenses	447.34
Admin (incl library)	513.31
Membership fees	9.75
Astronomy day	180.66
Education	406.53
IYA2009	1020.71
LPA	63.00
Observatory & Loan	28.05
Advertising	36.40
Regulus	704.79
Fall'N'Stars	822.00
Galileo Scopes	750.00
Misc.	9.38
Total Expenses	\$5591.40

Year Net:	-1697.01
Net assets year start 2008 Oct 01	\$23379.52
Year Net	-1697.01
Net assets year end 2009 Sep 30	\$21682.51

- Interest rates were low and returns were average from fixed term GICs.
- Next year interest returns will approach \$0.

Thanks Kim! ★

Epsilon Aurigae Update

The total phase of epsilon's two-year-long eclipse began in January. There is still time to get involved, and help solve the mystery of this star system! Just visit citizensky.org.

D'oh!

On page 8 of the February *Regulus*, the KAON report is actually for January 9th (not Dec. 12). Some thought was given to correcting this error in the online PDF file, but it seemed kind of weird to do that and yet have an erratum noted here! ★

For Your Compendium of Esoteric Facts

Walter MacDonald

For Your Compendium of Esoteric Facts is a short column that Leo Enright wrote from 1977-1988. I don't believe it has appeared since then. COEF was just one of many things that made Regulus such a great read over the years, and I thought it would be great to bring it back. So it is with great trepidation that COEF returns once again to the pages of Regulus.

EVERYONE SAYS that the great 40" refractor at Yerkes Observatory is the world's largest, but did you know that there was actually a larger refractor built in France? It was on display at the Paris Universal Exhibition of 1900 and had an objective of 49.2 inches. The optical tube was mounted horizontally and fed by a 79-inch flat mirror which tracked the sky. A handful of scientific

observations were made with the telescope during the Exhibition, but no buyer was ever found for it. Ultimately the instrument was scrapped. Fast forward approximately 100 years: recently some of the optics from this scope were found in storage in the basement of the Observatoire de Paris, and the flat mirror is currently on display at the observatory.★

Blast from the Past

...ALLUSION WAS NEXT MADE to the astronomical exhibit of the American manufacturers, including the fine displays severally shown by Dr. Brashear, Warner & Swasey, Saegmüller, and others. This exhibit was arranged on the floor of the North Gallery in the Liberal Arts Building and overlooked the Yerkes glass, itself an object of ceaseless interest to the thousands who, day after day, thronged that building, at once magnificent in its proportions and in its exhibits, the latter occupying forty acres of floor-space. Even when the great tube was motionless there was to the awed onlooker something uncanny about it, for it was not difficult to imagine the telescope to be a Thing of Life with a sleepless eye, oblivious of that which was around it, and ever trying to pierce the remotest depths of

Space. But this sensation, due to this pardonable personification, was vastly increased when, apparently without a human being near it, but really when electrically controlled by an assistant seated at a small table close to its gigantic base, it began and continued to move on its axes, slowly, gracefully, silently, and without a jar, as if in search of something hidden in the far distant Beyond. Truly this mighty instrument is a splendid, nay, a princely, gift to Science. The telescope was in charge of Messrs. Warner & Swasey, who took great pains to explain its mechanism to every astronomer...

A report on the Yerkes 40-inch refractor, then on display at The Chicago World's Fair of 1893. Paper by G.E. Lumsden, read at the

G.E. Lumsden, John A. Paterson

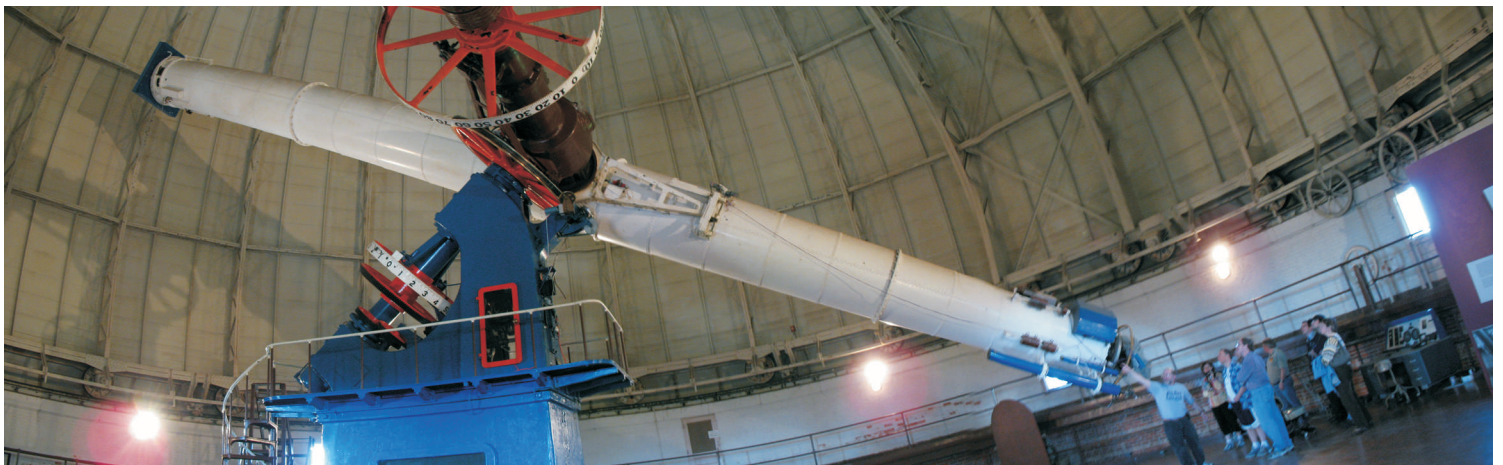
APST 24th meeting of 1893 (December 12). [Ref.: TAPST 1893, pp.129-130.]

THE YEAR 1893 HAS GIVEN BIRTH to a new engine of discovery, the great Yerkes' Telescope, the 40-inch Chicago Telescope (four inches larger than the monster Lick Refractor)...

The total weight is 75 tons, and, when pointed to the zenith, the object-glass will be 72 feet up in the air, about as high as a seven-storey house. What it will discover for us, we shall watch and chronicle with interest.

—John A. Paterson

From John A. Paterson's Annual Address, given at the APST 4th annual meeting held on 1894 January 9. [Ref.: TAPST 1893, pg.154.]★



The great 40" refractor at Yerkes Observatory. Here the floor has been raised to its highest position to afford ready access to the eyepiece. This panoramic image was taken by Vance Petriew in May 2006.

Wed/Thu, February 3/4

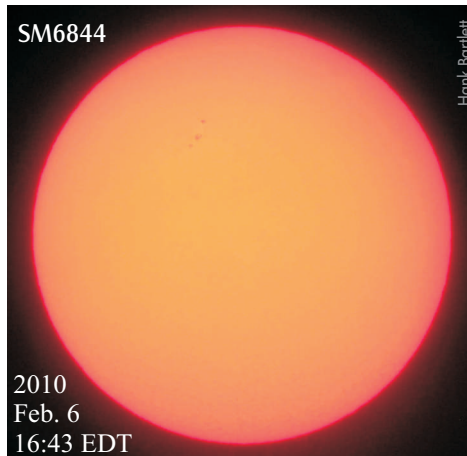
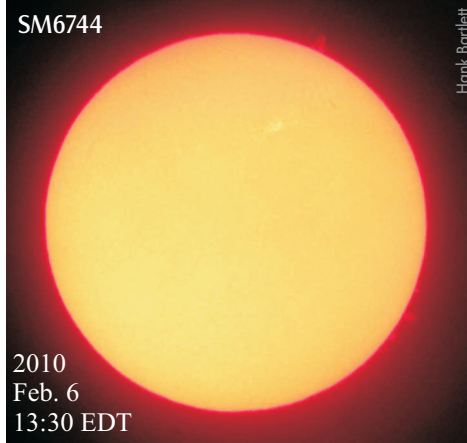
Kevin Fetter: The Milstar 6 geo sat, which I had to go look for, as they were moving it, is finished being moved to a new orbital slot. I observed it last night, to check up on it, and it was near where it was predicted (which tells me they are done moving it). It was fun to track it as they moved it and generate observational data, so its orbit could be updated. It's a nice one, as one of the brighter geo sats in orbit.

Walter MacDonald: How frustrating—we're right on the edge of a mass of cloud tonight (Feb. 6) here in Winchester and the sky is quite variable. I don't know how the Weather Network and Clear Sky Clock missed this. So much for having a crystal clear sky all night (like we had this morning). My fingers are crossed for tomorrow night, but I'm not getting my hopes up.

I did get a 7-hour imaging run in on Wednesday night, starting shortly after 11 p.m. (the sky cleared between 10 and 11 p.m.), imaging a total of 92 variables. It is nice to see the moon is on the wane and moving to more southerly declinations these nights, although that puts it in the pre-dawn sky along with the two good comets currently available. I haven't had time to process or do photometry yet, but I just checked an R CrB image and it is still faint.

Saturday, February 6

Hank Bartlett: Wow a nice sun and some good images, things are looking up, if only the sky had been steadier. I wanted to send an enhanced image but when I do that it makes the file too BIG. This is the raw H-alpha image from my Coronado SM60. SM6844 is tuned to the sun spots, 6744 is tuned to the prominences and the filaments. These were taken about 3 hours apart



so orientation is different.

Kim Hay: I had both scopes out yesterday (Feb. 6) looking at the sun.

The spots AR1043, AR1044 I could not see in white light, which is in your image 6844, and these are getting ready to rotate off. Nice filament action ahead of the spots.

The large grouping of spots in your 6744 shot is AR1045, and is growing. It has produced two C class flares, one at M2.97 on Feb 6 at 1:04 UTC, and one at M6.4 at 2:34 UTC Feb 7, and things just keep getting better.

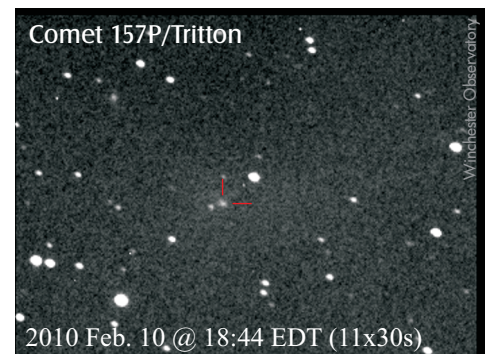
I was watching the the flare that was in question on Feb6 and it kept growing and pulsating.

Get your solar filters out folks, the sun is starting to wake up for Cycle 24

Sat/Sun, February 6/7

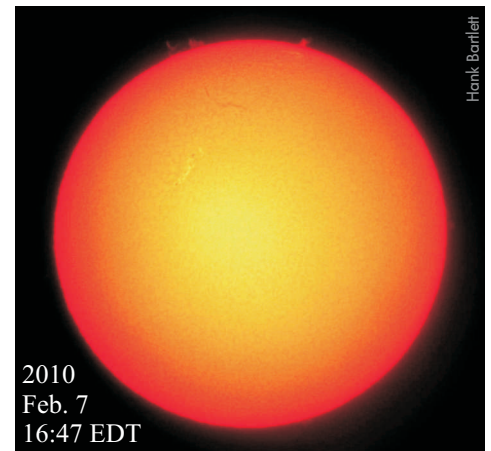
Walter: The conditions were iffy tonight. Comet 157P/Tritton (in Aries, at magnitude 11.8) was

imaged to kick things off. The skies stayed clear until shortly after midnight, when things clouded over completely. 75 variable stars were imaged in total.



Sunday, February 7

Hank: Wow another day and getting more active. SS1045 has formed into an awesome chain and SS1046 is coming into view. Note the about 15 Earth-diameter-long filament between 1045 & 1046. 1046 is just below the prominence in the upper right as a brighter active area.



Monday, February 8

Randy Attwood (Mississauga Centre): For every shuttle launch to the ISS, the orbiter passes over southern Ontario at the start of its 2nd orbit, about 100 minutes after launch. If the lighting is right, the shuttle can be seen—it must be dark on the ground but close enough to the terminator for the shuttle to be in daylight.

I saw the ISS come out of the Earth's shadow at 5:30 this morning and set in the NE. 25 minutes later,

Endeavour did the same thing, although further to the north than the ISS.

The shuttle is launched into the plane of the ISS orbit—*i.e.* they wait for the Earth to rotate the launch pad into that plane. It is not the position of the ISS in the orbit at the time of launch, it could be anywhere. If the Earth were not rotating, the shuttle would have appeared in the same area of the sky as the ISS—it was interesting to see how 25 minutes of Earth rotation to the east shifted the shuttle to the west.

This is only the second time I have seen the orbiter on its second orbit—probably the last as there are just a few more shuttle flights left.

Hank: It just keeps getting better, 1045 probably now covers a 100-Earth area when you include the active region and filaments. (See images at top of page.)

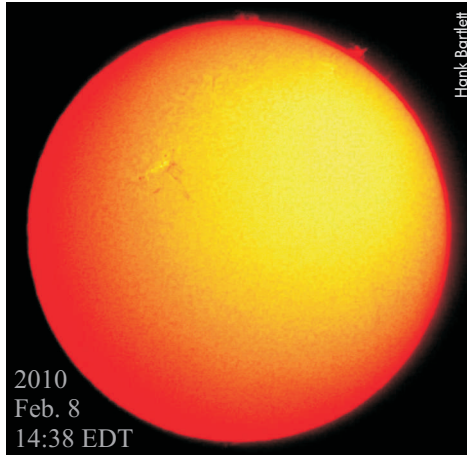
Wed/Thu February 10/11

Walter: The forecast was less than ideal, but the sky turned out to be quite good and it actually remained clear all night. 115 cataclysmic variables were imaged tonight. Cygnus is now straddling the evening and morning skies, but now is better placed at dawn than dusk.

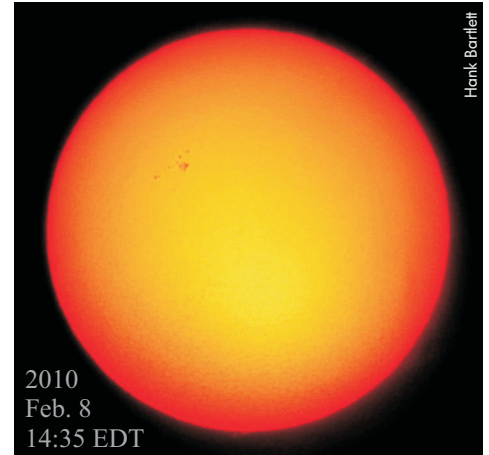
Winchester Observatory also did an all-night run the next night (Feb 11/12) and then an ~5-hour run the night after that (Feb 12/13) with the sky finally clouding over that evening about 23:30 EST. The clouds stayed...

Sat/Sun, February 20/21

Hank: Just one minute ago (18:24 EST) I saw a bright fireball heading across WSW horizon (north to south) travelling about 40° of angle downward toward Napanee (hope Napanee is still there, I will watch for zombies when I go to the gym in the morning). Initially I would guess it to have been about -8 and then



This image is with the Etalon tuned to the prominences and filaments so you can see



the true area. This image is with the Etalon tuned to the sunspots.

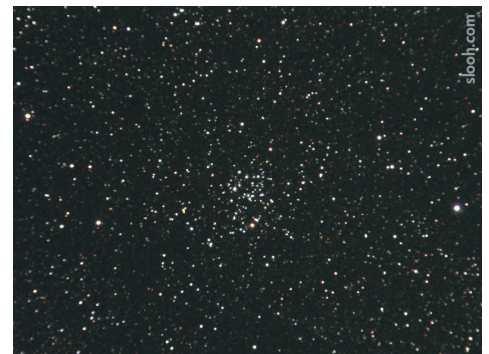
trailing out before it reached my horizon here in the village. I was just closing the blinds and had to reopen them because I saw a flash between the vanes, I was able to tell the angle mostly because there was a trail behind it. Colour was bright white against the pale blue sky with a orange to a graying out tail. Time would have been approx. 18:15 EST and lasted 1–2 seconds over 25° of travel.

Walter: Hank, this is just terrible. You have ruined our long streak of consecutive cloudy nights of non-observing!

Walter (again): No sooner did I send this message than a sucker hole opened in the skies over Winchester. The satellite loop does not look promising though.

Kevin Kell: Very cool...We were inside watching the Olympics and missed it...as did the all-sky cam...it doesn't fire up until 18:45 ET as it is still too bright for it (no iris and a 120 second exposure).

We did however just come back inside from watching first the space shuttle *Endeavour* go overhead in thick fog/cloud and less than a minute later the International Space Station, at least a magnitude brighter, following the same path. We took some 15 second images but the cloud cover washed out the objects a lot.



M50 in Monoceros is a nice little cluster located 4° NE of theta Canis Majoris.



NGC 3293 in Carina is one of many southern hemisphere showpieces.

"It is tempting to think that Hubble may have been to the observable region of the universe what the Herschels were to the Milky Way, and what Galileo was to the solar system."

-Nick Mayall

THE MEETING BEGAN on a positive note with the welcoming of **John and Jeanette Auer** to their first Centre meeting. John is a new member. The executive in attendance were introduced. Then the announcements began:

▶ The **KAON** session in March will include Kingston Centre participation and I will provide a brief presentation on *A Star of a Different Colour* as usual there will be tours of the dome and if clear some observing (a couple of volunteers for the deck scopes would be great).

▶ The Kingston, Frontenac, Lennox and Addington Science Fair is coming up in April on the 9th and 10th. In 2009 the Kingston executive decided to rename the Centre prize for this competition as the **The Leo Enright Memorial Award** for Best Project in Astronomy and Related Sciences. In the past there have always been more than one prize awarded but this has been reduced to a single prize consisting of \$75 and a copy of the BOG. We also provide a judge for this event and a request was made for a volunteer.

▶ **Astronomy Day** also comes up in April on the 24th and there is as of

yet no chair to organize this so anyone who has any interest in this should contact the exec.

▶ The date for **Fall'N'Stars** has been set for the weekend of the 18th in September. This is the dark site observing weekend jointly organized with the Belleville Centre.

▶ We have also been asked to participate in Little Cataraqui Conservation Area stargazing event in 2011, February 26.

It was then time to introduce our guest speaker for the evening. **Dr. Daryn Lehoux** is currently Queen's National Scholar Associate Professor. He has written *Astronomy, Weather and Calendars in the Ancient World* and is working on two other books concurrently, *Ancient Science and What did the Romans Know?* An inquiry into Worldmaking. The topic for our meeting was the Antikythera Mechanism and the advances made in determining its purpose. The geared mechanism was found in a shipwreck off the coast of the island of Antikythera in the Mediterranean. The ship wreck has been dated at 60 BC. It is important in that it demonstrates a very complex system of gears that was previously thought to be too advanced for the time.

Amazing insights into the inner workings and inscriptions have been made possible by new hardware applications (microfocus X-ray tomograph) and new H.P. Polynomial Texture Mapping software. There was also a great animation of the workings of the machine that was made from a model reconstruction. Seasonal/weather calendars, lunar cycles, solar eclipses and more were revealed. It was a great talk and there were a good number of questions afterwards.

During the break we had the usual 50/50 draw and a draw for an Apollo 13 video, and a barn door tracker (loan program excess). There were many recent library acquisitions that were signed out and quite a bit of socializing.

We closed out the meeting with observing reports and there was a lot more action than in past months. Solar, stellar, cometary and satellites were covered. There are two comets visible now, 81P/Wild and Siding Spring. We closed the meeting a bit early at 9:15 and there were quite a few members who stayed around to chat. It was good to have a surprise visit from a Laura Gagné, past president, and her daughter Jessica. Some then migrated to Wendy's for snacks for the road. ★

...New 'Alien' Invaders Found in Milky Way

...continued from page 1

University of Technology in Australia) has been accepted for publication in the *Monthly Notices of the Royal Astronomical Society*.

Previously, astronomers had suspected that some star clusters, which contain from 100,000 to a million stars each, were foreign to our galaxy, but it was difficult to identify which ones.

Using mostly Hubble Space Telescope data, Mr. Bridges and Mr. Forbes examined old star clusters within the Milky Way galaxy. From

the research they compiled the largest ever high-quality database to record the age and chemical properties of each of these clusters.

“We looked at all the data we could find. The best data are from the Hubble Telescope because it has the best imaging,” Bridges says. “We looked at the ages and the amounts of heavy elements in these clusters, which can be measured from their stars.”

The researchers' work also suggests that the Milky Way may

have swallowed-up more dwarf galaxies than was previously thought. They found that many of the foreign clusters originally existed within dwarf galaxies—‘mini’ galaxies of up to 100 million stars that sit within our larger Milky Way. The study suggests that there are more of these accreted dwarf galaxies in our Milky Way than was thought.

The research paper can be found at: <http://arxiv.org/pdf/1001.4289v1> ★

The Kingston Centre's Meteorite Collection

Kevin Kell

AT EVERY PUBLIC EVENT the Centre holds, we have a meteorite display out and the crowds love it. We normally have a bunch of these special rocks behind glass and one out that they can actually touch and handle. Historically this has been the private collection of a generous member. For some time we thought we should be investing in our own collection, to reduce the risk of loss or damage to the member, and to reduce the "pressure of donation performance" on our own members and their private collections.

We picked up the first three (NWA869, Gibeon Namibia,, NWA998 Martian) at the swap table at the Fall'N'Stars 2006 star party. The newest one (Campo Del Cielo Chaco Argentina) we purchased at the Queen's Miller Hall Geology Museum Gem sale in 2008.

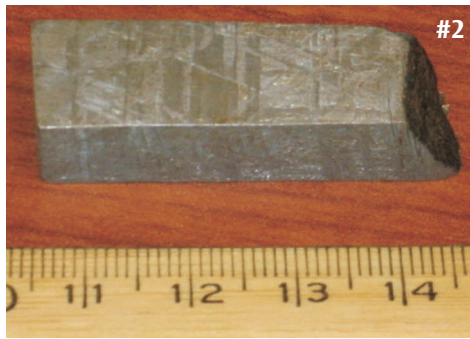
So, what do we have?

Meteorite #1: NWA 869 (North West Africa 869): Ordinary Chondrite–Brecciated L5.

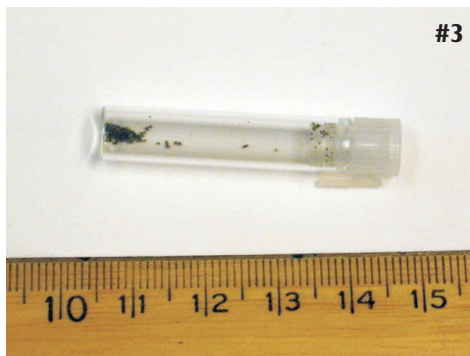
This meteorite was discovered in 1999 around Tindouf in Algeria and it is estimated that around 1500 kg of stones have been found, making it one of the largest Total Known Weight stone meteorites to come out of North West Africa.



Meteorite #2: Gibeon, Namibia, Iron Meteorite Fine octahedrite, 28 grams, etched slice.



Meteorite #3: NWA998 Northwest Africa 998 Martian Meteorite
Description: Unique Orthopyrxene bearing Nakhilite 10 milligrams Mars material Total Known Weight 456 grams. The Hupe Collection.



Meteorite #4: Campo Del Cielo Cahco, Argentina (Found in 1576) Iron Group IAB Octahedrite, fall date 4k-5k years ago, total known weight >100 tonnes

http://en.wikipedia.org/wiki/Campo_del_Cielo



We continue to keep our eyes open for more meteorites, and a better storage and display system than plastic baggies and a padded cloth bag.

At every public event we attend, we have a meteorite display out and the crowds love it. We normally have a bunch of these special rocks behind

glass and one out that they can actually touch and handle. Historically this has been the private collection of a generous member. For some time we thought we should be investing in our own collection, to reduce the risk of loss or damage to the member, and to reduce the "pressure of donation performance" on our own members and their private collections. ★

NWA 869
Classification: Ordinary Chondrite - Brecciated L5
The meteorite was discovered in 1999 near Tindouf in Algeria and it is estimated that around 1500kg of stones have been found, making it one of the largest Total Known Weight stone meteorites to come out of North West Africa. It is a very attractive looking meteorite and has a number of distinguishing features. When cut and polished, the matrix is full of colour and chondrules.
This meteorite has been classified numerous times by different institutions around the world and they have all come up with a different classification. One thing they all agree on however, is that it's an L-Chondrite! (UCLA originally classified NWA 869 as L4, but later reclassified it to L5, which stands as it's current official classification.
Petrography, Composition and Classification: (A. Rubin, UCLA)
A fragmental breccia of type 4-6 material; one thin section dominated by an L5 lithology gave olivine = Fa24.2.
Classification: Ordinary Chondrite (L4-6); S3, W1 \$15.00

Gibeon, Namibia, Iron Meteorite
Location: Gibeon, Namibia. (Latitude 25°, 20' S, Longitude 18° E.)
Time of Fall: In prehistoric times.
Structural Class: Fine octahedrite, Og, Widmanstätten bandwidth 0.3 ±0.5mm.
Chemical Class: Group IVA (91% Fe, 7.93% Ni, 0.41% Co, 0.04% P, 2.0 ppm Ga, 0.12 ppm Ge, 2.3 ppm Ir.)
28 grams Etched slice \$35.00

Meteorite Fragments, Campo Del Cielo, Chaco, Argentina (Found in 1576!)
GRENVILLE MINERALS
P.O. Box 453, Kingston, Ont., K7L 4W5

Northwest Africa 998 Martian Meteorite
Description: Unique Orthopyroxene-bearing Fe-Ni-Fe
10mg Mars Material
TW 456 grams
The Hupe Collection \$25.00