ORBIT

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Supernova Project Update

Harry Pulley

I contacted David Bishop and Tim Puckett for help in setting up our supernova search project. David was quite helpful and has an excellent web site, http://www.supernovae.net/supernova.html with many useful links, some of which I'll mention below. Tim's web site solicits people to help with his supernova search but he was not as helpful; I'm not sure if it is because he is busy or because he finds some looking for help are actually out to scoop him on discoveries. As of this morning I saw a circular posted to the RASC list saying that he's found another one so his techniques certainly work for him!

I send David an image of NGC 1023 I thought might contain a

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From The Editor

Ev Rilett

In the middle of December Gemini is quite close to the zenith with the moon and Saturn near by. Much literature is devoted to this constellation and in particular to the two leading stars ***Castor*** *"the Horseman"* and ***Pollux*** *"the Boxer.* The twin brothers are often depicted together on coins and as figureheads on many ships.

In the Greek world, the twins (sons of Zeus and Leda) were venerated by mariners and were invoked for protection against storms and the perils of the seas. In the legend of the Argonauts we find the twins guiding and protecting the adventurers in their quest for the Golden Fleece. Shelley's version of the Homeric Hymn to Castor and Pollux refers to this ancient tradition:

> *"When wintry tempests o'er the savage sea*
> *Are raging, and the sailors tremblingly call*
> *On the Twins of Jove with prayer and vow . . ."*

The Romans also considered Castor and Pollux to be protectors. Both brothers were believed to guide Roman armies to victory, a tradition made famous in western literature by Lord Macaulay's account of the famous Battle of Lake Regillus in his *Lays of Ancient Rome.* Another reference to Castor and Pollux occurs in Tennyson's *Maud*:

> *"It fell at the time of year,*
> *When the face of night is fair on the dewy downs,*
> *And the shining daffodil dies, and the Charioteer*
> *And starry Gemini hand like glorious crowns*
> *Over Orion's grave low down in the west,*
> *That like a silent lightning under the stars*
> *She seemed to divide in a dream from a band*
> *Of the blest . . ."*

SCHEDULE OF EVENTS

Hamilton Steam Museum hosts our General Meeting on the 1st Thursday of each month
Decemter
1 – General Meeting Speaker – Robert Goodwin & Using or Buying Telescopes
8 – Board Meeting @ Observatory
January
5 – General Meeting – Speaker - TBA
12 – Board Meeting @ Observatory

THE HAMILTON CENTRE OBSERVATORY:

From Highway 6 North of Hamilton.

Take Concession 7 East eastbound, cross Centre Road.
Continue on 7E, keep going past railroad tracks, to near end.
Observatory driveway is on the right just before the stop sign.

From Mississauga or Milton.

Britannia Road past Highway 25, Guelph Line, Cedar Springs Road to End. South 1 Block on Milborough Townline to Concession 7 East.
Our gate is on the south side of the last lot (south west).
The observatory phone number is (905) 689-0266.

YOUR BOARD OF DIRECTORS

President - Les Nagy - 905 388 1011 – president (at)hamiltonrasc(dot)ca
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LIST SERVERS

Check out our newest addition of communications. We have a **new website** found at http://www.hamiltonrasc.ca/new . Also, we have a new forum linked from the new homepage including an interactive calendar which members can contribute to, found at the following: http://www.hamiltonrasc.ca/forums
Les Nagy will be making improvements to their appearance and function as the weeks go on.

There are two list servers available for members to receive and contribute with informative conversation. Our local centre list. Get in touch with Mark Kaye (see Board of Directors List) and he will sign you up.

There is also the national list. Members must go the national web page to sign up for. http://www.rasc.ca/computer/rasclist.htm

PUBLIC EDUCATION

Public Education is very important at the Observatory. Among other events, our Centre is involved with Girl Guides, Scouts, and other groups interested in a guided tour of the night sky. We generally give a brief discussion, a slide show or other visuals, and then a tour outside with two or three different scopes. This gives the guests a chance to decide for themselves which type of telescope they like best.

It is wonderful to see the look on a child's face the first time they look through a telescope. Also, if you know of a group that may be interested in an evening under the stars call for a booking.

Call a board member to find out more. Your help is always welcome.

MONTHLY SWAP MEET

Feel free to bring in any astronomical items you no longer need in your collection. It might be just what someone else is looking for. A table will be set up each month for items to be swapped that evening. So, clear out that closet space and make room for some new, slightly used astro ware.

supernova and he replied that whenever he receives an image like that he 1) makes sure no one else had reported it already, and no one had; 2) does an asteroid search, which I'll describe below, which turned up no known asteroids; and 3) gets a second image, offset, to make sure it was not a hot pixel and I already had a second image, showing it was not a hot pixel. This lead to the last possibility, that it was just a background star which turned out to be the case. Most images of that galaxy have the core processed such that the star is hidden. David pointed me at an image which showed the star and the short lived thrill of a possible discovery was over. See figure 1 for my 'discovery' image with the star indicated by two white lines. Other supernova free images include those of figure 2: M77; figure 3: NGC 7331, 7335 and 7337; and figure 4: NGC 7270, 7271 and 7275. These images are not perfect from a pretty-picture standpoint but for detection images they don't need to be perfectly tracked and with the hazy, windy nights we've had lately these are some of the best I've acquired.

David also suggested the use of a V filter if we want to do follow-up work or post the magnitude of possible discoveries. Most professionals won't look at estimates made without a proper Johnson/Bessell V filter which blocks most UV, blue, red and IR light. Since different CCD cameras have different sensitivities to various parts of the spectrum, using a V filter helps to ensure that results from different instruments can be compared.

On November 25th, the supernova search group held its first meeting at the Leslie V. Powis Observatory. It was cloudy so the session was just for discussion, not capture of images. Andy, Victor and John met me there while Ken had another engagement. I went over the basic techniques for checking images for supernovae, including the minor planet checker at http://scully.harvard.edu/~cgi/CheckSN which lets you search for asteroids near any location or galaxy at a given time so make sure supernova candidates are not actually minor planets. If it turns out that an asteroid was in the region, then subsequent images can rule them in or out depending on whether or not they move. For this reason, it is often best to image a set of galaxies twice in the night with time between visits.

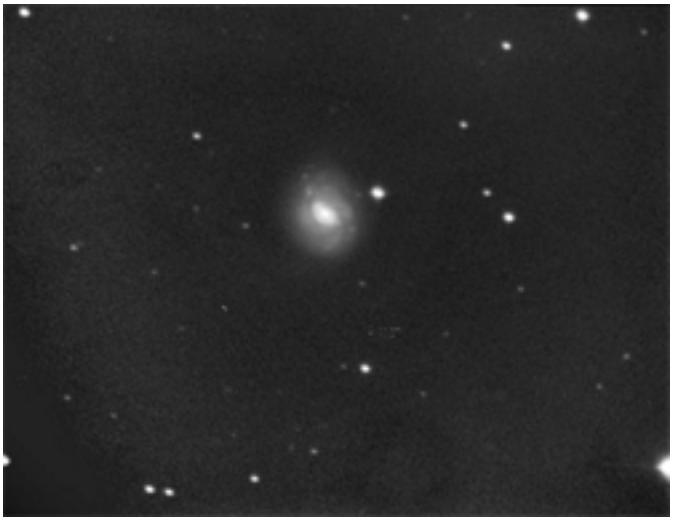
We discussed the size of the centre scope's CCD camera which yields very large images when used unbinned. If we take multiple 2-3 minute exposures of many galaxies in a night, the multi-megabyte raw image files will fill up disks very quickly and will make it difficult to disseminate search images unless they can be post processed into cropped and compressed images. Still, a large hard drive was discussed as a possible purchase for future.

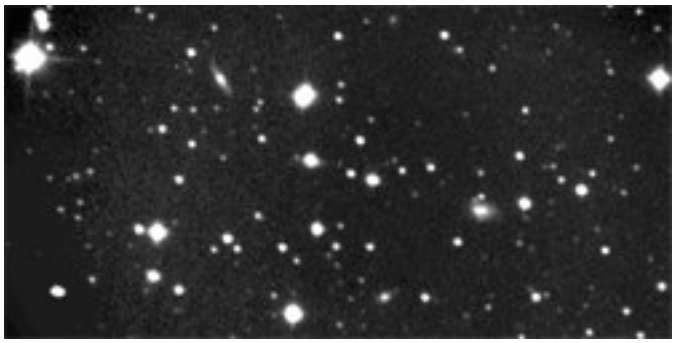
Overall, getting down a good procedure for the centre scope was identified as the first thing we need to do to get going with the project. Andy has had success in taking images and darks but is still working out issues. We'll meet again under clearer skies to work out the kinks and put together a few pages of instructions on how to use all the equipment and software.

Focusing the telescope with a CCD seems to be an issue. Andy said that with Roger's help it still took a long time to reach focus. This problem is compounded by the multi-use nature of the Trillium telescope: the focal points for eyepieces and cameras are vastly different so the focus is difficult to find again when switching between uses. Automatic focusing software is on the computer in the dome but it only works when the focus is close, not when it is so far away that no stars even show up. Andy suggested a Stiletto ronchi type focuser. Par-focal eyepieces can also be used though I'm not sure how hard it would be in this case.

The manual dome makes it impossible to automate a search at this time. Two members
would work best with one at the console and another working the dome. If the dome could be motorized or if the roof were converted to a roll-off structure it would be possible to write a script to control the telescope and camera to image a large number of galaxies automatically.

As previously mentioned, for photometric work we'd need a V filter. We'd also need a good way of taking flat fields and Andy mentioned a device which could be constructed and placed on the telescope like a dew shield to allow for simple acquisition of flat fields. We can try sky and t-shirt flats first to see if they're good enough but there are problems with sky flats due to gradients in the sky and other problems getting even illumination with t-shirt flats. You can try to reduce sky gradients by taking flats in different parts of the sky and median combining them but the light tube approach might be simplest, once constructed. If we don't want to do photometric work then a flat field is not really needed for supernova discovery images.





Images by Harry Pulley

Winter Skies

Ken Lemke

Winter will officially be upon us in a few weeks, but we've already had a taste, with some cold weather, snow and unfortunately many cloudy nights. While winter may not be the favourite time of the year for many of us, the sky on a clear, cold, crisp evening can be absolutely stunning. Some benefits (I always try to find the silver lining) with winter observing are that the hours of darkness are greatly extended versus other times of the year and there are no mosquitoes!!

Did you know that there are more of the brightest stars in the winter sky than at any other time of the year? And most of them are great starting points to some of winters' delights. I should note that the winter sky is my favourite, probably because it contains the first objects with which I became familiar when I started the hobby.

Some of my personal favourites are:

* Locate Aldeberan, a lovely orangish star in Taurus. To the west of Taurus is the Hyades, a large open cluster that is home to a number of double stars such as Theta and Delta Tauri. To appreciate the Hyades in it's entirety, I would suggest use of binoculars, a small telescope or a finderscope.
* Still in Taurus, but about 12 degrees to the northwest of Aldebaran is the Pleiades which never fails to impress, no matter how many times you observe this beautiful open cluster.
* Find Capella, the brightest star in Auriga. Located about three degrees to the west, is an interesting triangular, naked eye grouping called the kids. Auriga is also home to three nice open clusters, M36, M37, and M38. While, you're in Auriga, check out Theta Aurigae (with a telescope), the bright star (2.6 mag) about 10 degrees to the east of Capella. It's a nice multiple.
* The premier constellation of course for me, is Orion. Betelgeuse, the bright reddish star in the northeast of the constellation is a variable, whose subtle changes are interesting to follow over the course of the winter. On the opposite side in the southwest, is brilliant Rigel, which like many stars is a double. Can you pick out the 6.8 magnitude companion. Turning our attention to the eastern star in Orion's belt (Alnitak), you'll find a close (2.4arc-sec) bright white double. Just to the south of Alnitak, is one of my absolute favourites – Sigma Orionis, a multiple star system with five components. How many can you see.

We can't talk about Orion, without mentioning the real show piece and that is M42, the Orion nebula, another object that must be viewed every clear night. In the heart of the nebula of course is the trapezium. On nights of steady skies, pump up the agnification and see if you can see the E and F components of the "trapezium" – yes, there are six components to this multiple star system, not just four.

* Locate the Alpha star (Mirfak) in Perseus, and with binoculars, a small telescope, or your finderscope observe this large open cluster (Mirfak cluster). Best observed on nights of good transparency. While in Perseus, you might want to observe Algol (the Devil star). This is a short period variable. Times of minima are on page 70 of December's Sky and Telescope.

Next month, as we get deeper into winter, I'll address some of my other favourites. In the meantime, here's some other observing suggestions for December.

* In the west, early in the evening, we have Venus that is now in a waning gibbous phase, and will be a thin waning crescent by months end. Early, on the evening of December 4, Venus and a crescent Moon will be a nice pairing (photo op).
* Mars while fading in brightness and size is still a nice observing target. Mars won't be as good again for about a decade. .
* In early December Saturn clears the horizon about 9:30 PM, but you'll want to wait a few hours for it to get higher in the sky and out of atmospheric disturbance.
* For morning observers, Mercury puts in an appearance in the Southeast. Look to the lower left of Jupiter.
* M 31 (Andromeda Galaxy) is still well placed for observing in December.

To get the maximum enjoyment from winter observing, dress warmly with special attention to your hands, head and feet. Nothing will end an enjoyable evening of observing faster than cold feet. I find garments made with Thinsulate, to be very effective, and a good source of a variety of economical

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Winter Skies cont'd

garments is Mark's Work Wearhouse. Remember when dressing for winter observing, you're not making a fashion statement, it's dark, no one can see you.
Enjoy the night Sky

GOTO, part 2

Harry Pulley

I've successfully set up my GOTO and CCD camera plus focus motor through cables to my basement for a nice warm way to take images. There are still issues where it is impossible to tell from down there if the scope will point at a tree or a house instead of the object but overall it works fairly well. Incoming clouds are also hard to see except for the images which get dimmer and dimmer.

The dangerous part of remote operation is ensuring that no cables will snag a wing-nut on the mount and threatening to damage the drives or the equipment which is caught up. Using extra long cables helps.

Overall the GOTO points well, placing objects on the small chip of my CCD camera but it seems that something gets out of whack later after pointing to various points in the sky and the accuracy goes down. This loss of accuracy isn't a problem with eyepieces but with a small detector, it means the object is not quite on the chip. I'm not sure yet why this loss of accuracy is occurring but I'm beginning to suspect my anti-vibration pads which may shift some when the telescope moves to different parts of the sky. I will try without them in future to see if there is improvement. On at least one occasion a counterweight slipped down the DEC shaft, throwing the scope out of balance which didn't help either.

Finding galaxies and other extended objects is quite easy this way as you just centre up the object after a GOTO but another target which interests me is variable stars and they are proving more difficult. The American Association of Variable Star Observers (AAVSO) puts out good charts for finding variables but the view on the CCD camera does not always match the charts. Centering up the correct star is not easy but with practice I hope I can more easily identify the correct field, even when it contains nothing but stars with no easily recognized object there for me to say, "yes, that's obviously what I'm aiming for."

Earth Centered Universe (ECU) 4.0 works well at controlling the telescope remotely and works well on the old slow computers I use to control the telescope. In the first GOTO article I mentioned a problem with crossing the meridian and it is a problem as the hand controller must be pressed to rectify the problem. At present the hand controller is outside and I still need to verify that ECU can move the telescope when it is in that stuck state.

My CCD camera lacks a shutter and I'm not using a filter wheel at this time so dark frames are a bit of a pain. I have to take them at the beginning or the end of the night with the front cap in place on the telescope. Flat fields are similarly difficult.

I'm enjoying GOTO for its ability to find me galaxies and other targets which I would have
a difficult time finding from my light polluted back yard. In future I hope to explore the
possibilities of full automation with high-precision pointing software and a model of my back yard which could contain locations of trees and buildings to avoid.

Arizona Astro Adventure

By Colin Haig

What do Mars, Hubble, and the State of Arizona have in common? I decided to give up on Google, and go find out! A few days ago, the plane touched down in Phoenix, where it was a balmy 26C / 78F. This was a bit of an escape, to find some nice weather and get away from it all for about a week.

The next stop on the trip was beautiful, historic Flagstaff, home of the answer to this question. Figured it out yet? Yes, the Lowell Observatory, founded by amateur astronomer

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Arizona cont'd

Percival Lowell back in 1894. The historic home of the observatory is situated on the top of Mars Hill, about a 10-minute drive from the original downtown core of this very charming city. Several telescope domes are perched on this hill, including the 24" Clark refractor used by many famous astronomers and now any visitors lucky enough to arrive on a clear night when the scope was available.

As November 20 was Edwin Hubble's birthday, about 80 out-of-towners like myself were treated to a lecture on Hubble's connection to Lowell, and some fine views through the Clark and another telescope at the site. All of this for the princely sum of US$5 ! This may have been the bargain of the year for me, considering the price of any astro-accessories I seem to need these days. The presentation included a little background on this famous American astronomer, who used V.M. Slipher's work at Lowell as the stepping stone to further explanations of the expansion of the universe. Percival Lowell, famous for both his skill as an observer and the ridicule over canals on Mars, has proven to be a very visionary fellow. He founded this observatory, which continues as a private organization, and was able to attract some of the greatest observers of their day.

Vesto Slipher used the 24" Clark and spectrographic instruments to discover that the "spiral nebulae" were moving more quickly than any other objects known. Hubble, a man who was not "humble", used this discovery with observations of M31, the Andromeda Galaxy and the largest telescopes available later in his career to discover the expansion of the universe, and to resolve these spiral nebulae into objects composed of unique stars.

I had an opportunity to view the Andromeda "Nebula" first hand through the McAlister 16" f/3 telescope, and then to look for my own canals on Mars, through the 24" Clark. Seeing was not perfect, and in order to be helpful, the attendant had put a red filter into the 22mm Panoptic that was on the Clark. Personally, I found this spoiled the view, but not the experience.

While outside waiting in line for a glimpse, I was able to capture a few photos of Mars, the Pleiades, and the sky around Mars Hill, using my little Canon PowerShot digital camera. It's not as fancy as my Pentax DSLR, but it did the job this night.

A few days later, Meteor Crater beckoned, as did the Grand Canyon on another day. I must thank Roger Hill for sharing his previous visit at a past Centre meeting. If it weren't for his enthusiasm, I likely would have missed this interesting experience. Perhaps its time to admit I was pretending to be on the surface of Mars, walking in the red dust that seemed to collect on my shoes and clothes, while wandering over ancient Arizona sandstone. Valles Marineris on the Red Planet is many times the size of Earth's mile-deep ode to erosion. But I'm sure that our multi-coloured planet made our canyon a little more beautiful. Oh, and did I mention that I was going through about a litre of water for every 1-2 hours outside? Mars is maybe a bit too dry. As my explorations continued at Meteor Crater which is between Flagstaff and Winslow, our guide reminded us that the Barringer Crater is private property, unlike the Grand Canyon. He shared with the visitors some photos of Dr. Gene Shoemaker guiding the Apollo astronauts around the crater for some crash-course geology lessons. I recommend you review the article "Geology and/or Astronomy – Part 3" by Ev Rilett, in the June 2002 issue, which touches on this 550-foot deep impact site.

After some more relaxation, a visit to Tucson and the extra hour up to Kitt Peak were slotted in. A quick check of the Weather Channel reminded me of the rapidly freezing country north of the border, but did not prepare me for the 60 knot winds experienced on the mountain top. The winds were so severe, that visitors were not able to visit the 4metre Mayall telescope at the mountain's edge, but we were able to see the McMath-Pierce Solar Telescope, a giant towering over 100 feet high, and bored over 200 feet deep into the sandstone. A heliostat, or flat mirror, at the top tracks the sun and then sends the beam down the tunnel, bouncing the image off multiple mirrors until it reaches

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spectroMeteors and other instruments in a set of underground chambers.

A few hundred paces away, we passed a green tennis and basketball court, sadly overgrown with desert scrub brush and long, dry grasses. The docent remarked how these astronomers aren't a terribly athletic bunch. Everybody giggled. Next stop was up to the 2.1m telescope, which was quite impressive in size. With the wind howling, the desert seemed more powerful, more overwhelming, and yet more stunningly beautiful. The visitor's center was typical, but not as engaging as Lowell. However, being on Federal land, there is no sales tax, so I was delighted to pick up a pair of Coronado Bino-Mite solar binoculars at a very good price. A few minutes later, I was observing at the summit, and was treated to a very tiny sunspot surrounded by some faculae.

As I wound down this little vacation, the winds pushed the car back to Scottsdale on the outskirts of Phoenix, where I was able to gather a few photos of Orion lying down on the job, gathering strength in preparation for a long winter. Other side trips had taken us through Sunset Crater and other national monuments (Americanese for National Park), including some spectacular Pueblo ruins. From one of these sites, it was possible to see the sun shining on the wall inside a ruin, as it danced along the jagged tops of San Francisco Peak, and other area mountains. I was inspired to wonder what the ancient astronomers were looking for as they watched the sun, as I had done. It helped connect it all together, whether sun, stars, Mars, or the dirt on my shoes. I felt I had made a discovery of my own, and was reminded of Percival Lowell's quotation, etched into glass over a doorway at his observatory:
"One day with life and heart is more than time enough to find a world."

Here is a short description of the pix.

Grand Canyon:
canyon.JPG - The Grand Canyon
finder.JPG - Unique 1-power finder scope for finding objects in the canyon
finder2.JPG - Another look at the 1-power finder

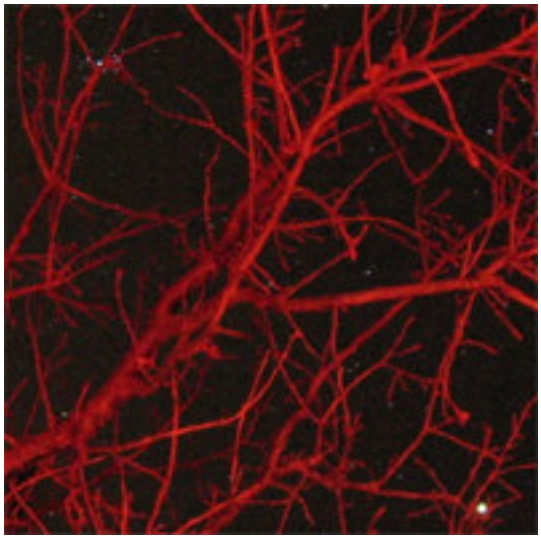
Kitt Peak National Observatory:
kittpeak.JPG - Collection of telescopes at Kitt Peak National Observatory, taken from the 2.1m scope
kittpkch.JPG - Howling winds and intense sun take their toll
mcmath.JPG - McMath Pierce Solar Telescope

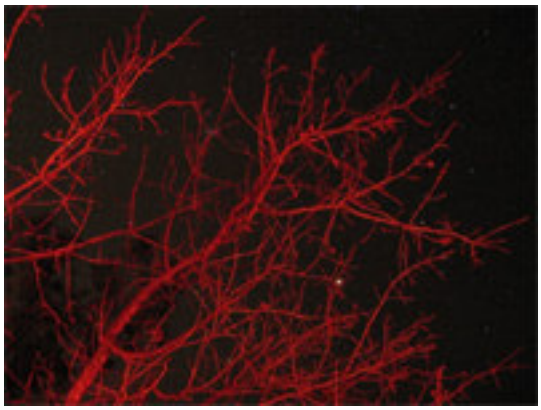
Lowell Observatory:
Clark.JPG - The 24 inch Clark Refractor at Lowell Observatory
clark2.JPG - Stars over the Clark, which is pointed up at Mars.
crater.JPG - Pauline & I at Meteor Crater near Winslow AZ
marstre1.jpg - Mars and Pleiades through a tree lit by only safety lights
marstree.jpg - As above.
pleiades.JPG - Pleiades near the McAllister 16" scope

Phoenix:
orion.JPG - Orion over desert plants
pueblo.JPG - A pueblo ruin with astronomical alignment

Web Sites

Learn more by visiting:
http://www.lowell.edu/
http://www.meteorcrater.com/
http://www.az.gov/
http://www.noao.edu/kpno/





Photos by Colin Haig