From The Editor

Your newsletter is jam-packed with goodies this month! We start off with the tale of Vladimir Pariev's Canada-Russia Venus Transit Project. It is a great story about amateur astronomy clubs on opposite sides of the Earth working together. Vladimir did an outstanding job on this project and deserves our thanks for an opportunity to be a part of it.

Our stalwart and much appreciated-contributor, Greg Emery, is embarking on the experience of a lifetime and promises to share the ride with us when he can over the upcoming year. Bon voyage, Greg! Don't forget to write.

John Gauvreau provides us with tantalizing telescope targets in his fantastic monthly column, The Sky This Month. Mario Carr keeps us on our toes with his Astronomy Crossword and Alex Tekatch keeps it all in perspective with her Cartoon Corner.

All that, Chair's & Treasurer's reports, some videos and lots of beautiful photos, too. Enjoy!

Ann Tekatch

Chair's Report by Bob Christmas

Summer 2012 was very eventful for astronomy and space exploration. It got started with the Venus Transit across the Sun in June, which was witnessed, and imaged, by so many of us in the HAA and the general public, myself included! What a scene! This summer also showed us some very nice planetary conjunctions in both the morning and evening skies, and witnessed the annual Perseid Meteor Shower in August. Also last month, NASA's Curiosity rover made a daring but successful parachute and retro-rocket landing on Mars, and is now beaming back to Earth countless stunning images of its neighbourhood on the surface of Mars, inside the Gale Crater. I, for one, very much look forward to the pile of science that is going to be learned over the next while as Curiosity roams around Gale Crater and Mount Sharp as it analyzes rocks and soil in the area, with the main goal of finding out if Mars was once capable of supporting life in the distant past.

Unfortunately, this year's HAA Perseids night in Binbrook was washed out by the weather. But several HAA members still got the chance in mid-August to see some Perseid *(Continued on page 2)*

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Chair's Report (continued)

meteors when the clouds did part. Even a baseball teammate of mine saw a couple of Perseids in a dark sky while on vacation in Havelock, east of Peterborough, at around that time! I, myself, didn't see any Perseids, but I'm glad many people didn't leave empty-handed, so to speak!

Now, summer is just about over, the kids are about to go back to school, and the early-fall night-sky is starting to set in. At this time of year, the Milky Way perfectly bisects the prime-time evening sky. To the south-west, Sagittarius and all of its deep-space beauties, including the Lagoon nebula (M8), the Trifid nebula (M20), and countless other Messier and non-Messier DSO's hang around through mid-October before they say good-bye until next spring and summer. Further up the Milky Way from there, constellations like Aquila, Cygnus and Cassiopeia beckon the autumn sky enthusiast with countless nebulae, open clusters, globular clusters, etc., and don't forget the Andromeda Galaxy and M33!

Down here on Earth, we're getting ready for another exciting season for the HAA, and, on that note, it's almost time for our Annual General Meeting (AGM), which will take place during our October 12th meeting, when the HAA elects its Council for the following year. But before that, longtime HAA member Tim Philp will be our main speaker at our September meeting, which is on Friday, September 7th this year, one week earlier than usual.

In closing, I must say a few words that I wish I didn't have to say. I was deeply saddened when I heard the news that we lost one of our greatest all-time pioneers and explorers, when Neil Armstrong, the first human to ever walk on the moon, passed away at age 82. He inspired countless others to follow him out into the vastness of space, beyond our Earth, and he continues to captivate and inspire numerous space enthusiasts who have hoped, and still hope, to one day reach for the stars and space, and to continue expanding the frontiers of knowledge of space and astronomy for all of us. I hope this will be Neil's lasting legacy.

Clear Skies!

Bob Christmas

Treasurer's Report by Steve Germann

This summer the council has been actively spending the last of our budgeted items, and a few new incidental expenses that will make our club better. First we purchased a laptop computer to use during presentations. This will eliminate the incompatibility problem where presentations won't display on the projector, and allow the club to have continuity for their software. As an added bonus, the laptop will be used to create our 2013 calendar. Fully decked out, compatible with the programs our speakers use for presenting, it cost $1041.06. We bought some reflective vests for volunteers to wear at our public events. We also paid for next year's rental of the auditorium. Other expenses were minor and are summarized below.

Opening Balance:	$7669.93
Revenue:	$118
Expenses:	$2308.83
Closing Balance:	$5506.11

Revenue items included 50/50 for the June meeting ($63), and 2 memberships ($55). Expenses included Hall rental ($1130), Laptop Computer ($1041.06), Vests ($112.77), Speaker expense ($25) .

Masthead Photo Credit: Sunset over Lake Niapenco by Don Pullen. Taken on Sat Jul 14 which was the Movie Night at Binbrook. Note the crepuscular rays in this beautiful image. Don states that the image is "… a quasi-HDR image I created from 3 different exposures and then tone-mapped."

Observing the Transit of Venus from Two Separate Places

by Vladimir Pariev

As all of you know, the biggest astronomical event this year was the transit of Venus in front of the solar disc. On June 5, Venus passed directly between us and the Sun for the first time since 2004, and for the last time until 2117. It was our last opportunity to witness a Venus transit in our lifetimes. No doubt that I was very excited and eager to observe this event.

As many of you know, Venus transits were used in the past centuries to determine the scale of the Solar system, and primarily the value of the astronomical unit, the distance from the Earth to the Sun (semi-major axis of the Earth orbit, to be precise). The way to do that was to note when Venus made contact with the Sun's disc as seen by two or more observers located far apart, often on opposite sides of Earth. The moments of contacts would have been recorded with as much accuracy as possible, so that by knowing the difference between the times of contacts, ephemeris of Venus, and locations of the observers one could calculate the parallactic displacement of Venus on the sky in arc seconds. The so-called "black drop effect" often interfered with determining the exact moments of contact. The black drop is a tiny black bridge between the black disc of Venus and the edge of the solar disc when Venus is very close to its second and third contacts. Because of this black bridge the exact time of second and third contacts cannot be well determined.

Thinking about the Venus transit I got an idea to try and determine the Venus parallax by directly comparing two photographs taken at the same moment of time from two distant places on Earth. The pair of photographs could be taken at any time during the transit, not only at times of contact. One would overlap two photos and measure the displacement between the two images of the black Venus disc on the Sun. Obviously, the black drop effect would no longer be a limitation for the accuracy of the measurements. Knowing the angular displacement of Venus on the photos and the base line between the locations of observers on Earth, one can calculate the distance to Venus and, ultimately, the value of the astronomical unit. One also needs to know the orbital elements of Venus as expressed in astronomical units. Those come from observations of positions of Venus on the sky outside transits and subsequent orbit determination calculations. These calculations have been performed since the time of Kepler and the result is an almost circular orbit with radius r_V= 0.72 AU. There was no photography before the 19th century and photography was just beginning to be used in astronomy in 1882, the year of the last historical Venus transit. So, I was thinking, this is why the method of comparing two simultaneous photographs of the transit was not used previously for determining the value of the astronomical unit.

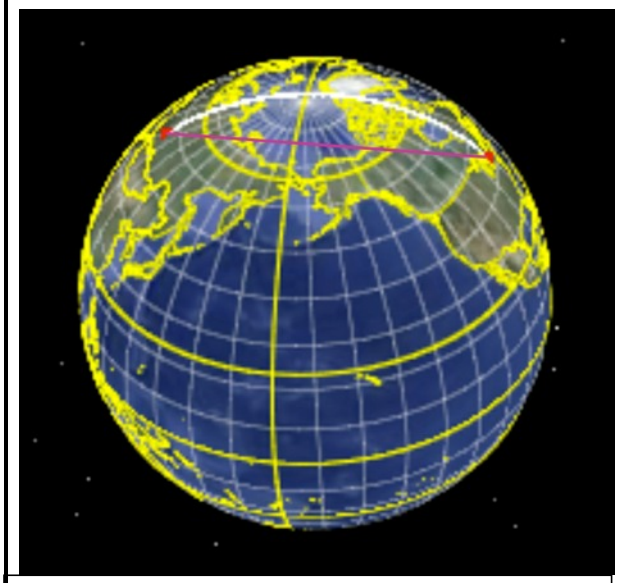

Fig. 1
Google Earth simulated view of the Earth as it was seen from the direction to the Sun (and Venus) at 7:20 p.m. EDT on June 5, 2012. Locations of Krasnoyarsk and Hamilton are shown by red dots. White line is the shortest distance connecting two places along the Earth's surface. Purple straight line is the base line of parallax b.

Fortunately, I have a friend in Russia, Sergey Karpov, who is the head of the amateur astronomy club in Krasnoyarsk (a town in southern Siberia). He has experience photographing the Venus transit of 2004, and is very enthusiastic about astronomy. The 2012 and 2004 Venus transits were fully visible in Krasnoyarsk, from beginning to end. In fact, Siberia and the northern Polar Regions are the only places on Earth where both 2004 and 2012 transits could have been observed completely, from the first to the fourth contacts. I decided to give the project a try with the participation of astrophotographers in Hamilton and Krasnoyarsk. The times for making simultaneous photos were pre-arranged and were obeyed with an accuracy of about 5 seconds *(Continued on page 4)*

Observing the Transit of Venus from Two Separate Places (continued)

on both sides. In addition, I was in real time SMS contact with Sergey Karpov during the transit, so that we could quickly pick and synchronise moments of taking pairs of photos if the sky was cloudy and the Sun covered by a cloud at a pre-arranged moment of time. On the Hamiltonian side, Doug Black kindly allowed me to share his telescope for the observations, and Bob Christmas, Ann Tekatch, Jim Wamsley, and Kerry-Ann Lecky Hepburn all helped by taking photos at a set of prearranged times in Hamilton area.

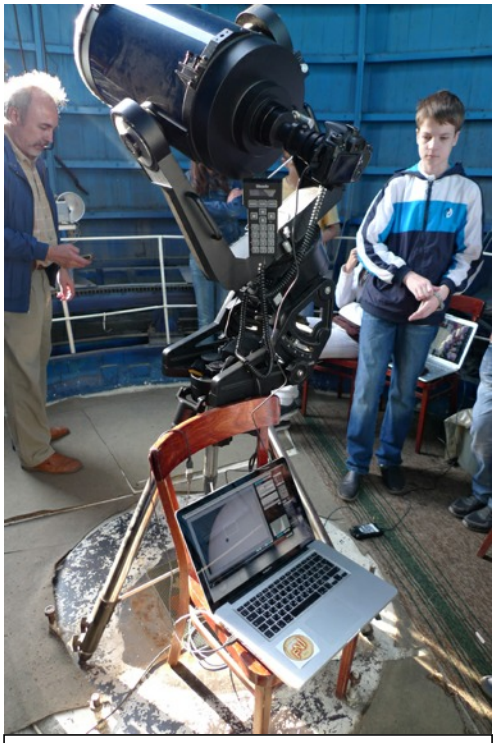

Fig. 2
Sergey Karpov (on the left) is looking at SMS message from me on his cell phone on the sunny morning of June 6th 2012 . Schmidt-Cassegrain telescope is pointed to the Sun. Images were taken by SLR camera in direct focus and downloaded to the laptop computer.

The weather co-operated both in Krasnoyarsk and in Hamilton. The transit was observed during the morning hours of June 6th, 2012 in Krasnoyarsk starting soon after sunrise, while at the same time here in Hamilton it was evening on June 5th. Sunset at around 9 p.m. limited the visibility of the transit in Hamilton even before Venus reached the middle of the transit, while the Sun was still up and rising higher until the transit finished with the fourth contact in Krasnoyarsk after midday there. Krasnoyarsk time was exactly 12 hours ahead of Hamilton time, which made synchronisations easy. These two places are indeed located on the opposite sides of Earth as illustrated on the Google Earth image of the globe as the Earth was viewed from Venus (and the Sun) at 7:20 p.m. EDT on June 5th. (Fig.1). The two red dots are Krasnoyarsk (to the left) and Hamilton (to the right). The white line is the shortest line on the surface of Earth connecting the two cities, as an airplane would follow, if there were a direct flight from Hamilton to Krasnoyarsk. Happy people observing the Venus transit with a Schmidt-Cassegrain telescope at the Krasnoyarsk club on the morning of June 6 can be seen in Figs.2 and 3. The sky in Krasnoyarsk was clear but with haze. The Hamilton sky was perfectly clear. Many members of the Hamilton Amateur Astronomers club gathered at the Binbrook Conservation Area on the shore of Lake Niapenco. Fig.4 is a photo of some members (Ann Tekatch is among them) enjoying the transit on a very clear sunny evening on June 5th 2012. It was a very exciting moment when I, Ann Tekatch, and some other club members noticed the glowing thin crescent of Venus's atmosphere a short while before the second contact! We were very lucky with the weather to see the Venus atmosphere exactly the same way as when it was first discovered by Lomonosov during the Venus transit of 1761! Although people in Krasnoyarsk were able to enjoy the whole duration of the transit, haze caused some light scattering and the atmospheric glow of Venus was not noticeable.

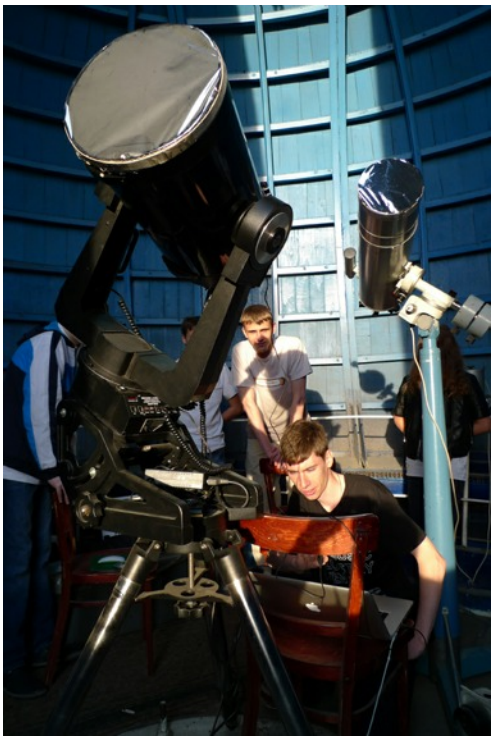

Fig. 3
Viktor Sevastianov (Krasnoyarsk club member) is ready to snap a photo of the transit. Two telescopes are covered with solar filters. Other club members savour the awe of unique observations.

After I had got photographs of the transit from both Hamilton and Krasnoyarsk I was faced with some issues, which had to be taken into account before the

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difference in positions of Venus could be measured. The first issue was to orient the images correctly, so that the direction to the celestial north would be exactly the same on both images out of a simultaneous pair. As it happened there were a few spot groups on the Sun, which could serve as markers. The position of sunspots on the solar disc is the same as viewed from both Krasnoyarsk and Hamilton, so one can align the north on both images by rotating them until all groups of sunspots on both images coincide. Also, one needs to scale the images so that the limbs of the Sun on both images exactly coincide. It turned out that it was impossible to have both spots and limbs exactly aligned, if the spots were aligned then the limbs were slightly misaligned. This effect could be due either to a slight distortion of the images introduced by the optics and alignment of the telescope with the camera (by the way, for this reason of noticeable misalignment I could not use my own photographs for the project) or to refraction of light in Earth's atmosphere which caused the disc of the Sun to appear not exactly circular.

I could disambiguate between these two effects by trying to overlap two sets of images taken by Ann Tekatch and Bob Christmas independently from each other and using their own different set ups. It turned out that their images align perfectly, both spots and limbs could be brought to exactly the same positions by rotating and scaling the images. Unfortunately, I could not do the same check for the Krasnoyarsk images because there were no other observers taking photos in Krasnoyarsk simultaneously with Sergey Karpov and Viktor Sevastianov. At least I was now sure that Ann Tekatch's photos did not suffer from instrumental distortions. The next step was to correct all images for atmospheric refraction.

Fig. 4
Members of Hamilton Amateur Astronomy club watching the Venus transit and enjoying a sunny afternoon on June 5th 2012 on the shore of the lake at Binbrook Conservation Area near Hamilton.

The altitude of the Sun during observations varied from 8 to 20 degrees above the horizon both in Krasnoyarsk and Hamilton. Because the disc of the Sun spans half a degree in altitude, the lower points on the disc are lifted by refraction of light a little bit more than the upper points on the disc. This causes the disc to appear a little compressed and not exactly circular. Of course, the positions of sunspots, Venus and everything else on the disc is influenced by refraction exactly in the same way. I used the empirical formula for the refraction given by T. Saemundsson in 1986 in the article "Atmospheric Refraction", Sky and Telescope, volume 72, page 70 as follows:

(1)
$$\rho = 1'.02 \cot\left(h + \frac{10.3}{h + 5.11}\right),$$

where ρ is the refraction, i.e. how a point on the image is lifted due to the bending of a light ray, and h is the true altitude of this point in degrees, and the refraction is given for temperature +10°C and pressure 101.0 kPa . True altitude is the altitude of the source, which would have been observed had the Earth atmosphere been removed (pure thought experiment, of course). The difference between values of ρ across the disc of the Sun is what interests us. Since half a degree across the Sun disc was much smaller than h, we can take a derivative of the dependence $\rho(h)$ with respect to h to find the differential refraction (in arc seconds per one degree of altitude h):

(Continued on page 6)

(2)

$$\frac{d\rho}{dh} = -1''.07 \frac{1 - \frac{10.3}{(h+5.11)^2}}{\sin^2\left(h + \frac{10.3}{h+5.11}\right)}.$$

Actually, the refraction depends on the pressure and temperature in the atmosphere. I looked up those conditions for the interesting moments on weather websites and obtained that one should use -1".02 instead of -1".07 in the expression for $d\rho/dh$ for Krasnoyarsk, and -1".013 for Hamilton. I used these values to calculate the amount of additional linear scaling for altitudes h of the Sun at the moments of taking the photos.

In order to apply the corrections to the images in accordance with expression (2) one also needs to know the direction up to the zenith on the images, so that scaling in the graphics software (I used Adobe Photoshop package) can be done in the proper direction. It seems like an obvious thing to locate the direction up or down on the photo, but it turned out not that easy to determine. First of all, one can find calculated true azimuth A and true altitude h of the Sun for any time, any date, and any location on Earth using U.S. Naval Observatory calculator located at http://aa.usno.navy.mil/data/docs/celnavtable.php. One can also find there the declination of the Sun δ_{sun} and Greenwich Hour Angle of the Sun t_{sun} for any needed time and date. Then, we know the latitude of Krasnoyarsk φ_1 = +56°01', the longitude of Krasnoyarsk λ_1 = +92°58', the latitude of Hamilton φ_2 = +43°15', and the longitude of Hamilton λ_2 = -79°52'. Using these data one can calculate the angle between directions to the celestial north and to the zenith for every position of the Sun on the sky at any moment of time in both Krasnoyarsk and Hamilton. So, the problem is reduced to finding the direction to the celestial north on at least one of the photos of the Sun during the transit (when the solar spots did not have time to move significantly due to the rotation of the Sun). Hundreds of photos of the Sun during the transit were taken by amateur and professional astronomers and made available on the web. Yet, after many hours of intense browsing the web I could not find a single image that would have the orien-

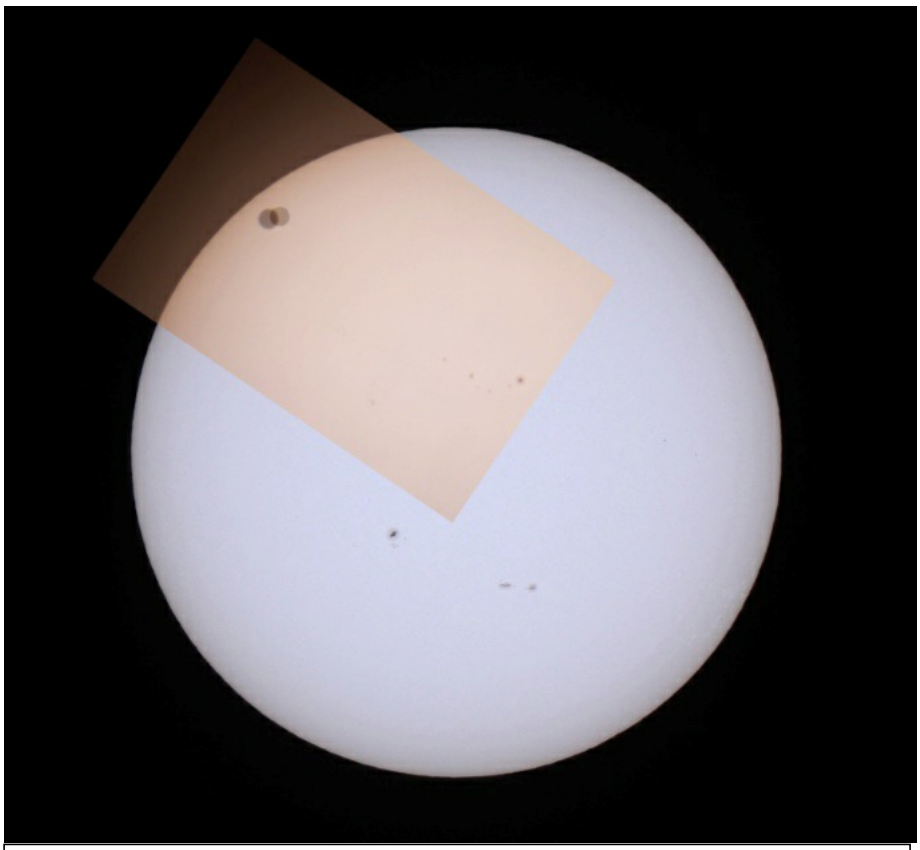

Fig. 5
Image of the Sun's disc (white) by Ann Tekatch is overlapped with the image of the part of the Sun (beige) by Viktor Sevastianov. Both images are taken at 6:40 p.m. EDT on June 5, 2012 and are corrected for the refraction. Note the displacement between positions of Venus on the two images: while the Sunspots and discs are coincident, positions of Venus are not.

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tation indicated without ambiguities. The solution came from Ann Tekatch who had taken an image of the setting Sun with Venus on it, right before sunset. Her image had two spruce trees projected on the Sun disc. I compared this image with another photo of the same stretch of the horizon with the lake and conifer trees taken before sunset. Finally, this comparison of the line of the water horizon to the direction of the branches of the spruce tree and direction of the branches of the spruce tree to the locations of sunspots allowed me to fix the direction up relative to the Sun spots. Then, calculations resulted in finding the direction to the celestial north on this image of the setting Sun and so on all images taken in Hamilton and Krasnoyarsk. Reverse calculations gave the direction to the zenith on Krasnoyarsk images (which was, of course, not the same as the direction to the zenith on Hamilton images).

Now I could scale the images by the amount given by formula (2) and then rotate and scale the images trying to achieve an exact overlapping of sunspots and limbs of the solar discs. The correction for the refraction did help in reducing the discrepancy that I mentioned above, although not completely. Still, tiny misalignment of the limbs remained. This might be due to the instrumental distortions in Krasnoyarsk or small errors introduced by Adobe Photoshop software when it did multiple interpolations between differently sized pixels on the pair of images being overlapped. An example of an overlapped pair of images is shown in Fig.5. The angular diameter of Venus was 58". Zooming in on the region with two Venus images, I measured the displacement in units of Venus diameters. The displacement turned out to be about 32".

Now let us calculate the base line of the parallax, that is the projection of the distance between Krasnoyarsk and Hamilton onto a plane, which is perpendicular to the direction to the Sun at the moment of taking a pair of photos. This base line b is approximately the length of the straight line connecting two cities on Fig.1. The formal calculation can be done as follows. Let us introduce a rectangular system of coordinates X,Y,Z rigidly rotating together with Earth with the origin at the centre of the Earth. Axis X is directed to the point on the surface of the Earth with longitude $\lambda = 0$ and latitude $\varphi = 0$, axis Y is directed to the point of the surface of the Earth with longitude $\lambda = +90°$ and latitude $\varphi = 0$, and axis Z is directed along the rotation axis of the Earth to the North pole. Let the radius of the Earth be $R = 6371$ km and assume the Earth to be exactly spherical (good enough for our approximate calculations). Then, using trigonometry one has for the rectangular coordinates of Krasnoyarsk in this system $x_1 = R \cos\varphi_1 \cos\lambda_1$, $y_1 = R \cos\varphi_1 \sin\lambda_1$, $z_1 = R \sin\varphi_1$. Rectangular coordinates of Hamilton are $x_2 = R \cos\varphi_2 \cos\lambda_2$, $y_2 = R \cos\varphi_2 \sin\lambda_2$, $z_2 = R \sin\varphi_2$. Unit vector $\mathbf{n}_{sun}$ in the direction from the Earth to the Sun has rectangular coordinates $n_{sun\,x} = \cos\delta_{sun} \cos t_{sun}$, $n_{sun\,y} = -\cos\delta_{sun} \sin t_{sun}$, $n_{sun\,z} = \sin\delta_{sun}$. The projection of the vector connecting Krasnoyarsk to Hamilton, $\mathbf{B}$, on the direction to the Sun, i.e. onto the unit vector $\mathbf{n}_{sun}$, is the scalar product of these two vectors:

$$(\mathbf{B} \cdot \mathbf{n}_{sun}) = n_{sun\,x}(x_2 - x_1) + n_{sun\,y}(y_2 - y_1) + n_{sun\,z}(z_2 - z_1) = B \cos\mu,$$

where μ is the angle between two vectors $\mathbf{B}$ and $\mathbf{n}_{sun}$, and B is the length of vector $\mathbf{B}$. Substituting expressions from trigonometry above, one obtains for $B \cos\mu$:

(3) $$B \cos\mu = R[\cos\delta_{sun} \cos\varphi_2 \cos(t_{sun} + \lambda_2) - \cos\delta_{sun} \cos\varphi_1 \cos(t_{sun} + \lambda_1) + \sin\delta_{sun}(\sin\varphi_2 - \sin\varphi_1)].$$

The square of the distance between Krasnoyarsk and Hamilton is

(4) $$B^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2 = 2R^2 [1 - \sin\varphi_2 \sin\varphi_1 - \cos\varphi_2 \cos\varphi_1 \cos(\lambda_2 - \lambda_1)]$$

Then the base of the parallax b can be found by using Pythagorean theorem $b = \sqrt{B^2 - (B \cos\mu)^2}$.
By substituting expressions for $B \cos\mu$ and B from equations (3) and (4) one can see that b is proportional to R multiplied by a lengthy combination of trigonometric functions, which we *(Continued on page 8)*

omit here for the sake of brevity and reading convenience. Actual calculations have shown that *b* was close to 8000 km, slightly changing by a few hundred kilometres during observations.

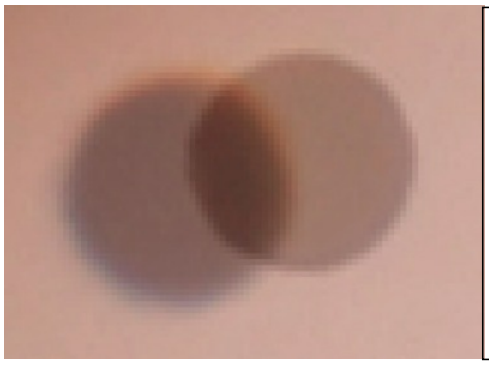


Fig. 6
Magnified region of Fig.5 around two overlapped Venus images. Venus as seen from Krasnoyarsk is on the left (east), another Venus disc as seen from Hamilton is on the right (west). Celestial north is exactly up. Two circles have the same radii and are fitted to match the limbs of Venus discs. Inclined line connects the centres of two circles. The length of this line is 32" and the angle it makes with the direction to the west (exactly to the left) is 14°. Inclined line at the bottom illustrates predicted angle of the displacement between centres of Venus discs. Predicted angle is 11° with respect to the west.

Angle μ was close to 80° to 90°, that is the baseline between Krasnoyarsk and Hamilton was close to perpendicular to the direction to the Sun (as you can guess from Fig.1). The magnified region of Fig.5 around two overlapped Venus discs is shown on Fig.6.

Now we know *b* and measured offset between two images of Venus π after corrections. Let the distance from Venus to the Sun be ar_v and the distance from Earth to the Sun be ar_e, where *a* is the value of the astronomical unit that we want to find. On June 5, 2012 there were $r_e = 1.015$ and $r_v = 0.726$. The distance from Earth to Venus was $a(r_e - r_v)$ as all three, Earth, Venus, and the Sun, were on the same straight line. Therefore, parallax of Venus with respect to distant stars was $\pi_v = b/a/(r_e - r_v)$. The position of the Sun on the sky was also a little different when viewed from Krasnoyarsk and Hamilton, the difference being the parallax of the Sun $\pi_{sun} = b/a/r_e$. Since the displacement π was measured relative to the visible surface of the Sun (Sun spots and Sun disc), it is the difference between the parallax of Venus and the parallax of the Sun: $\pi = \pi_v - \pi_{sun}$. Then,

$$\pi = \frac{b}{a(r_e - r_v)} - \frac{b}{ar_e} = \frac{r_v}{r_e(r_e - r_v)}\frac{b}{a}.$$

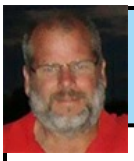
Solving this equation for *a* we finally arrive at the expression for the astronomical unit *a*:

$$a = \frac{b}{\pi}\frac{r_v}{r_e(r_e - r_v)} = 3.25 \cdot 10^9 km \cdot \frac{1}{\pi''}\frac{b}{R},$$

where in the rightmost expression π'' is the value of measured Venus displacement on photos in arc seconds, and b/R is the value of the base of the parallax expressed as a multiplier of Earth radii. With the values $\pi = 32''$ and $b/R = 1.3$ we obtain the final result of our project *a* = 130 million kilometres.

The value of astronomical unit that we got is 15 per cent less than the actual astronomical unit of 150 million kilometres. This accuracy is worse than the accuracy of about 2 per cent achieved from 18th century observations of the Venus transit by timing the contacts at many locations on Earth. Still the number 130 million kilometres is reasonably close to the actual value given all the uncertainties of our matching procedure of the images. It was very satisfactory and rewarding to get a reasonable result at the end of this amateur project.

Finally, I would like to mention that this project is a result of the interest, collaboration and help from a number of people, members of Hamilton and Krasnoyarsk astronomy clubs. I am grateful to all of them for their support of this project. Especially, I would like to mention the efforts and time spent on this project by Sergey Karpov from Krasnoyarsk and Doug Black from Hamilton, without their participation this project would not have been possible.



Through the Looking Glass by Greg Emery

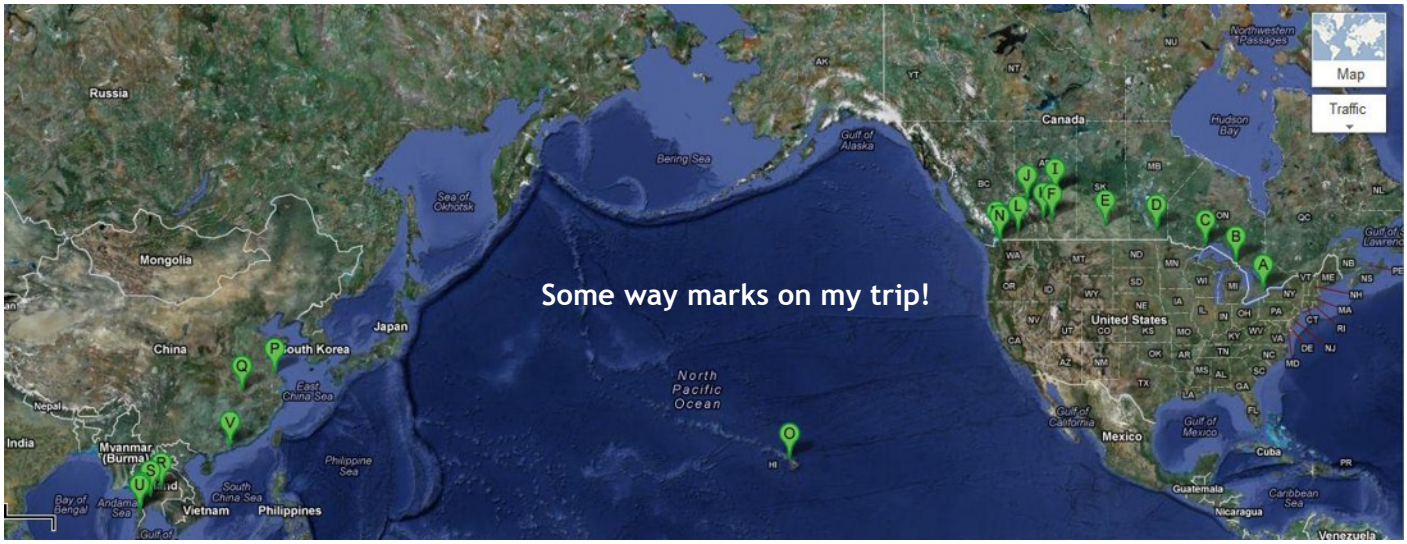
It is so hard to believe that September is already here. The summers of my youth always seemed to fly by with unimaginable speed. There were always so many plans that were never acted upon. As I age I find this to still be the case. I wanted to get out and observe more, but I didn't. I wanted to do some much-needed maintenance on my telescope, it didn't happen. I wanted to sit down for five minutes and catch my breath, but my chair is still empty.

I am now sitting at the keyboard trying to figure out how to say goodbye – well more of an Adieu than a goodbye. My sabbatical was approved, so I am off to China for a year. I will be bringing my wife, Joanna, and my two youngest with me. I am excited about going, but part of me is more excited about the extras that Joanna and I have added on to living in China, than about living in China. I will not bore you with all the details, spare two, which apply, to astronomy. We will be stopping in Hawaii for a week on the way to Shanghai. I know for a fact that there is room in my luggage for my binoculars (Celestron 9x63's that I bought for a previous trip to the Southern Hemisphere). I am hoping that our time on the beach on the Big Island will provide me with the chance to see some wonderful objects. In February, during the spring festival, we will be travelling outside of China. My 21 days on various beaches in Thailand most likely will give me some observing chances. The beaches are around 5 to 10 degrees north latitude, so there should be ample sky, north and south, to see. I played real quickly with Cartes du Ceil; Orion should be more or less at zenith – can't wait to see that!

I have been asked to give a few lectures in addition to the courses I am teaching. I hope that I will be able to give a few astronomy talks. As I prepare them I will definitely be thinking of the HAA and of many of you. I do not get out to as many of the meetings or events as I would like, or as I should, but I never the less feel very connected to the HAA and to all of you. While I am away I hope to be able to continue to write my ramblings that I call Through the Looking Glass. I cannot guarantee a monthly submission to the EH, I can't even get 10 consecutive monthly contributions when I am in the country! I will try to keep in contact with the club and with some of you privately. For those of you who don't read on, Adieu my friends and enjoy the clear skies when you get them!

To maximize the world experience we are trying to create, we are driving across Canada to Vancouver, including a flight up to Inuvik, Northwest Territories, to cross the Arctic Circle. Once in Vancouver, we will be dumping the car then busing to Bellingham, WA for a flight to Honolulu. After a few days on Oahu we fly to the Big Island for 4 days on the Kona coast (I promise no pictures of me in a bathing suit). Then we proceed on to Shanghai. I will be teaching in Wuhan for the most part. The break between the two terms is going to be utilized by going to Hong Kong and Thailand. From what I can calculate I am looking at about a minimum of 34,000 km of travel between now and next July.

Looking forward to seeing you all next summer!



The Sky This Month: September by John Gauvreau

Sky Calendar

September 7 - Moon 1 degree from Jupiter (very late at night)

September 9 - Moon occults Ceres (early morning)

September 12 - Moon 4 degrees from Venus

September 13 - Venus 2 degrees from M44, the Beehive Cluster

September 15 - New Moon

September 22 - First Quarter Moon

September 22 - Autumnal Equinox, the Fall season begins

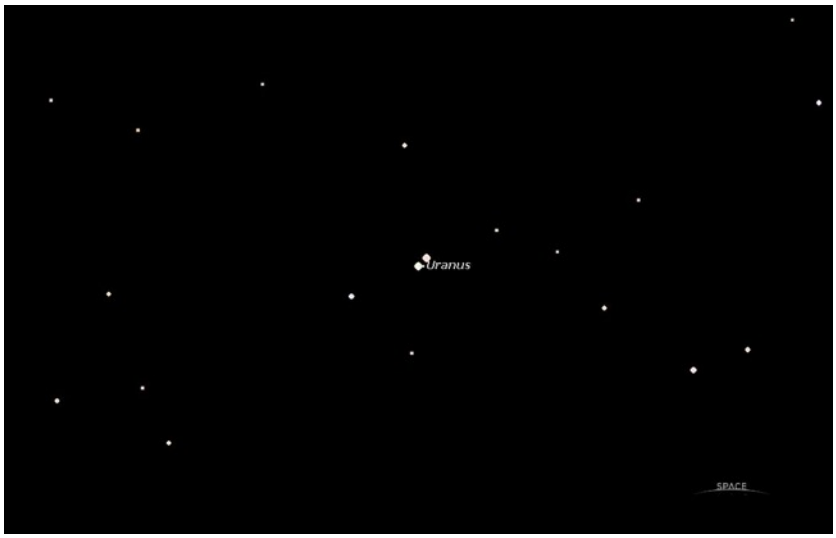
September 22 - Uranus 1 arc minute from 44 Piscium, a 6th magnitude star

September 29 - Full Moon, the Harvest Moon

Under the Sky

Autumn arrives this month and compared to our last meeting, in June, there is not only a big difference in the weather, but a big difference in the sky. The longer nights and cooler air make for a very pleasant observing experience, and I hope you get to enjoy some time outside under the stars.

At the last meeting I spoke about double stars, one of my favourite observing targets. This month I want to draw your attention to a very strange pairing of a planet and a star in the sky. Even though this isn't a double star (not even an optical double, since it is a close pass of a planet and a star) but observationally it will appear as such. **Uranus** will pass only 1 arc minute for the star **44 Piscium** on the night of September 22. Go out the night before and they will be about 3 arc minutes apart, and if you have a look the night after (September 23) they will appear about 2 arc minutes apart, so it is worth checking them out all three nights to watch them pass each other. What makes this observing opportunity so great is that the planet and the star are almost exactly the same brightness! Uranus is magnitude 5.7 and 44 Piscium is magnitude 5.8. They are a nearly perfectly matched pair. Can you see the difference of a tenth of a magnitude? If you think you can, are you sure it's not a colour difference? Or perhaps it is due to Uranus being an extended object and the star being a pinpoint (that may actually make the brightness difference seem reversed). And what about that colour difference? How do they look to you? Just how blue does Uranus look? This may not be a spectacular sight, especially after we've had a summer full of conjunctions, eclipses and transits, but it is a very rare sight, so use your binoculars or your telescope (or both!) to catch this non-double pairing.



(Continued on page 11)

The Sky This Month (continued)

Earlier in the month is another unusual event. the moon will occult the minor planet **Ceres**. Ceres used to be classified as the largest asteroid, but then there was that whole uproar at the International Astronomical Union in which they reclassified several solar system objects (you remember Pluto getting booted off the planet list) and now Ceres is considered a minor planet, along with Pluto. On September 9 between 3:30 and 4:30 in the morning (sorry, but you'll have to lose some sleep for this one), the Moon will actually occult, or pass in front of, Ceres. Now Ceres is only magnitude 8.8, so it will be difficult to spot next to a bright moon. Use at least your binoculars, but a telescope will be better. If it helps, move the moon off the edge of the field of view to get fainter stars (or in this case, fainter minor planets!) to show up. As an added bonus, you'll see **Jupiter** up above the moon, and all four moons will be visible during the hour it takes for the moon to pass in front of Ceres. That will give you something to do while you wait for Ceres to reappear. The reappearance will occur suddenly, so watch carefully. I'll look forward to hearing if anybody actually stays up to see this one.

Although Jupiter doesn't rise until midnight, other than Uranus and Neptune it is the best planet available. **Saturn** and **Mars** set almost immediately after dark, and are so low in the west as to be almost unobservable.

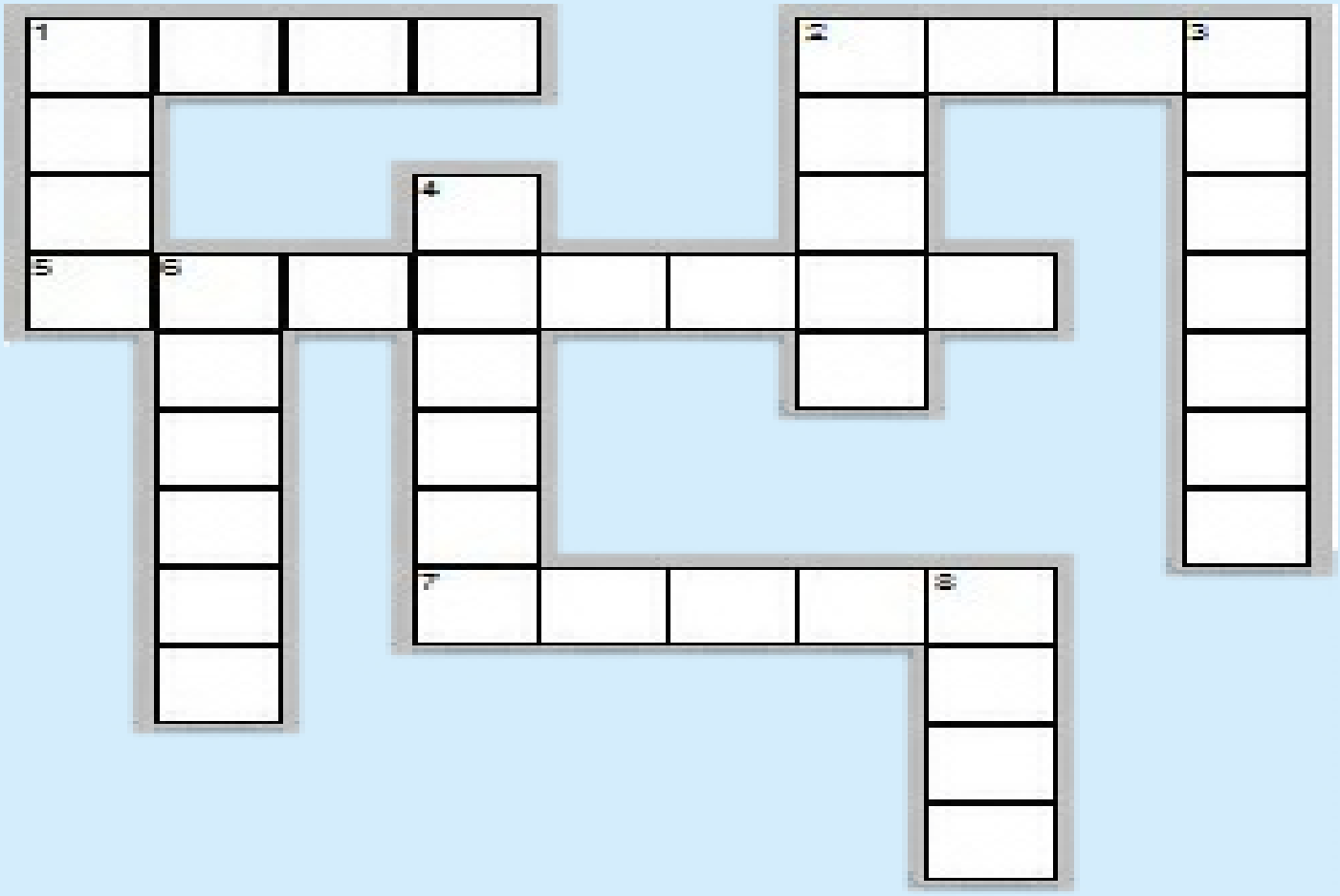
The month ends with the Harvest Moon on the evening of September 29th. It's not the biggest or the brightest full moon of the year, but it may be the most romantic. Depicted in art, story and song, what landscape isn't at its best under the harvest moon. No telescope required; just go outside and give yourself a few minutes to enjoy the bright moonlit land, cool autumn air, the sky and the season, and celebrate your own bountiful harvest of celestial riches under the harvest moon.

As always, feel free to send me any observing reports, photos, questions, or comments that you would like to share with your fellow members. I love to hear about your observing experiences. See you out there!

John

observing@amateurastronomy.org

Astronomy Crossword by Mario Carr



Across

1. On July 15, this object passed near Venus and Jupiter
2. Bright star in Lyra
5. Beside the teapot
7. A star in the summer triangle

Down

1. On July 24, this object grouped with the moon, Saturn and Spica
2. Brightest planet in the July morning sky
3. Bright star in Scorpius
4. A nebulae near the spout of the teapot
6. In perpetual flight
8. July's full moon

Answers on page 19
No peeking!

Time Lapse Photography by Don Pullen & Ann Tekatch

Cherry Springs
Milky Way Video

Click on the hyperlink above and you will be treated to a time lapse sequence put together by Don Pullen from images he took at this year's Cherry Springs Star Party at Cherry Springs State Park in Pennsylvania. The Cherry Springs Star Party is an annual event under very dark skies in the mountains of Pennsylvania.

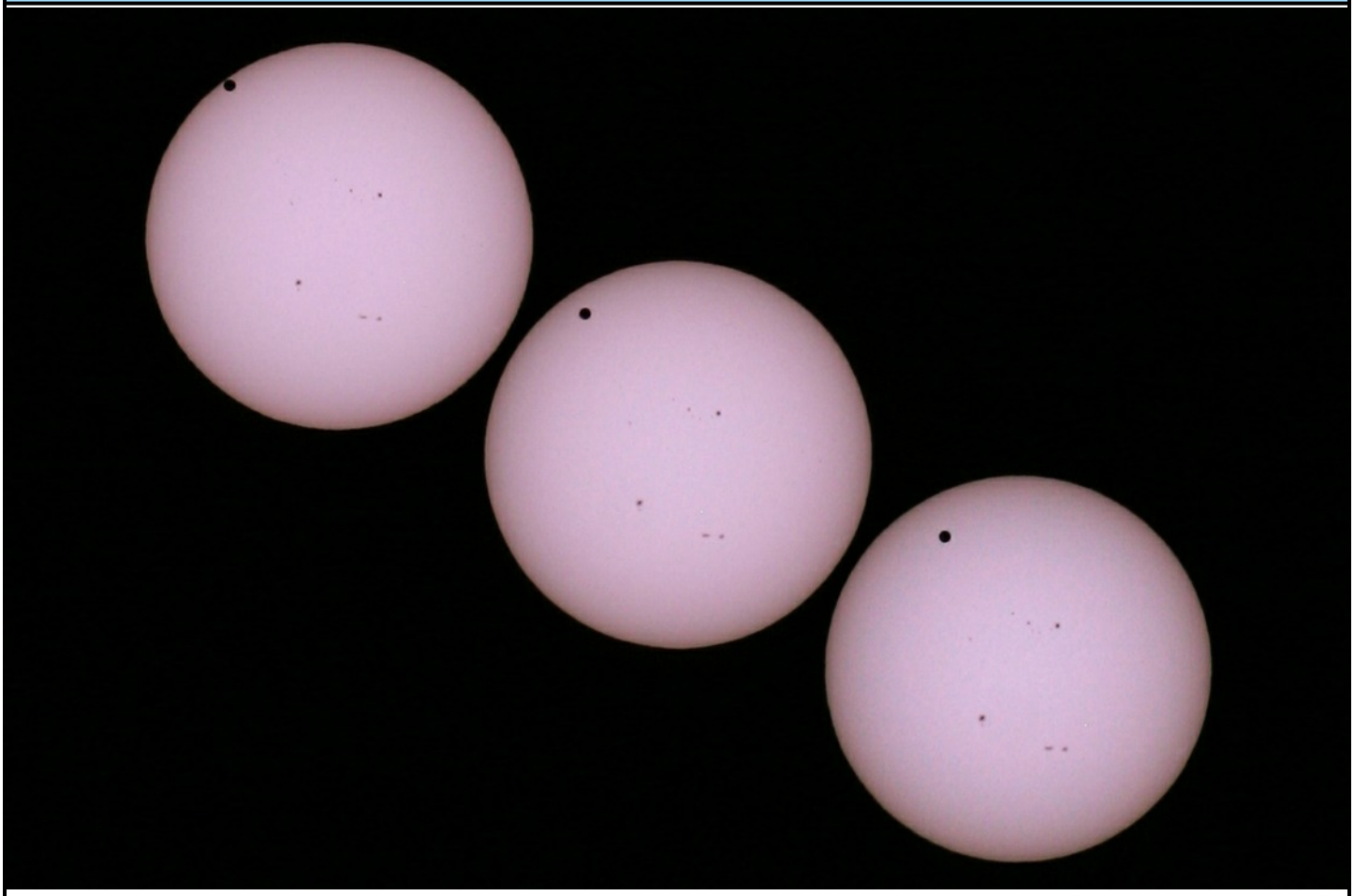
In this short video, you can see the Milky Way rise above the changing red lights of astronomers attending the star party. The constellations of Scorpius and Sagittarius are clearly visible. Time lapse photography is becoming popular among amateur astronomers. It will likely be a topic for discussion at our newly-formed Astrophotographer's Group which will begin meeting in October.

Hope to see you there.

HAA Helps Hamilton

To support our community, we will be collecting non-perishable food items and cash for local food banks at our general meetings. Please bring a non-perishable food item to the meeting or a donation of cash and help us help others in these tough economic times. If you would like to help or have any questions about this initiative, please contact Jim Wamsley at 905-627-4323.

Venus Transit Images



http://youtu.be/kRzwFqp44W8

Top: Bob Christmas made a collage from three of his transit photos.
Left: Keith Mann photographed Venus against the sun in hydrogen-alpha light.
Above: Hyperlink to Ann Tekatch's video of a plane passing in front of the Venus transit.

More Venus Transit Images

Left: Close-up of Venus as it passes in front of the Sun. Note the faint, glowing, white arc of light that highlights Venus's atmosphere. Photo by Ann Tekatch.

Below, Left: Jim Wamsley snapped this white light image of the Venus Transit. You can see the individual sunspot groups as well as the clearly defined black circle of Venus.

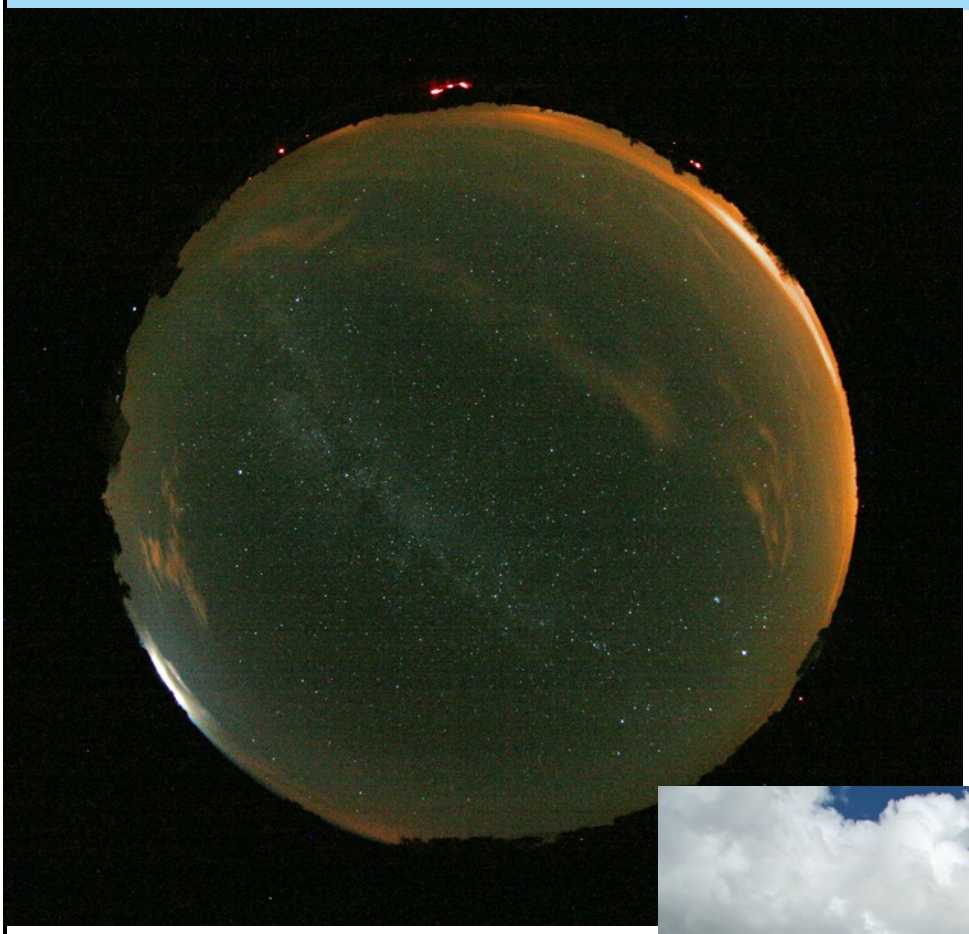
Below, Right: Doug Black (left) and Vladimir Pariev (right) prepare Doug's Schmidt-Cassegrain telescope for the transit. Photo by John Gauvreau.

Bottom, Left: Venus continued its transit across the sun well after sunset for us. Ann Tekatch took this image as the sun was slipping behind the distant trees.

Images from Starfest 2012
River Place Park near Mount Forest, Ontario

Top left: Sunset conjunction of Saturn, Mars and Spica.
Top right: "Aposaurus" - homemade 6" apo-chromatic refractor by Alan Ward.
Middle left: A mantis checking out Donna Cairns' Starfest program.
Middle right: Ollie and Lou Darcie (longtime HAA members) try to convince me that they are enjoying washing dishes!
Left: The crowd gathering in the main tent for the door prizes. (The HAA did well at the draw - Patty Baetsen won a pair of binos and Bill Tekatch won an Explore Scientific eyepiece!) Photos by Ann Tekatch.

More Images from Starfest 2012
River Place Park near Mount Forest, Ontario



Left: Steve German took this awesome all sky image of the night sky at Starfest. The bright white light on the bottom left edge is from distant thunderstorms. Exposure was 30 seconds through a Sigma 180 degree fisheye lens.

Below: Fluffy cumulous clouds helped keep us cool during the day, but disappeared at night. Photo by Steve Germann.

Left: The Earth's shadow creeping up on Starfest from the east at sunset. Photo by Alexandra Tekatch. Taken with a Fujifilm Finepix S80EXR camera. Exposure was 1/18 second at f/3.3 and ISO400.

H.A.A. 2013 Calendar
Submission Request

It is that time of year, when we are putting together the 2013 H.A.A. Calendar. This beautiful wall calendar has been produced by our club for the past 5 years and has always been a big hit. It includes not only astronomical events for the year, but showcases some of the best work that our members have done, including astrophotos, images, drawings, artwork and club events.

We invite you to submit material for the calendar. Anything that is astronomical or club related is suitable. This year has seen some wonderful conjunctions, a solar eclipse and the transit of Venus so we have great expectations for the 2013 calendar!

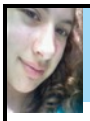
Guidelines for submission:

Images must be horizontal (or landscape) format, NOT vertical (or portrait) format.
Images must be of the highest resolution available.
Please include details on the equipment used, exposure time, ISO, and date of the image.
Images must be the work of an H.A.A. member
Deadline for submissions is September 30, 2012

Not all images will be included in the calendar. Images will be selected by the calendar committee.

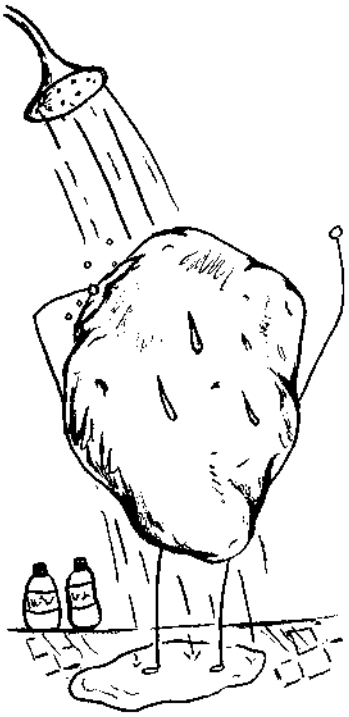
The H.A.A. calendar features work exclusively from our members. Your submissions are what makes the H.A.A. calendar one of the best in the country, so submit as many images as you like.

Email your submissions to observing@amateurastronomy.org

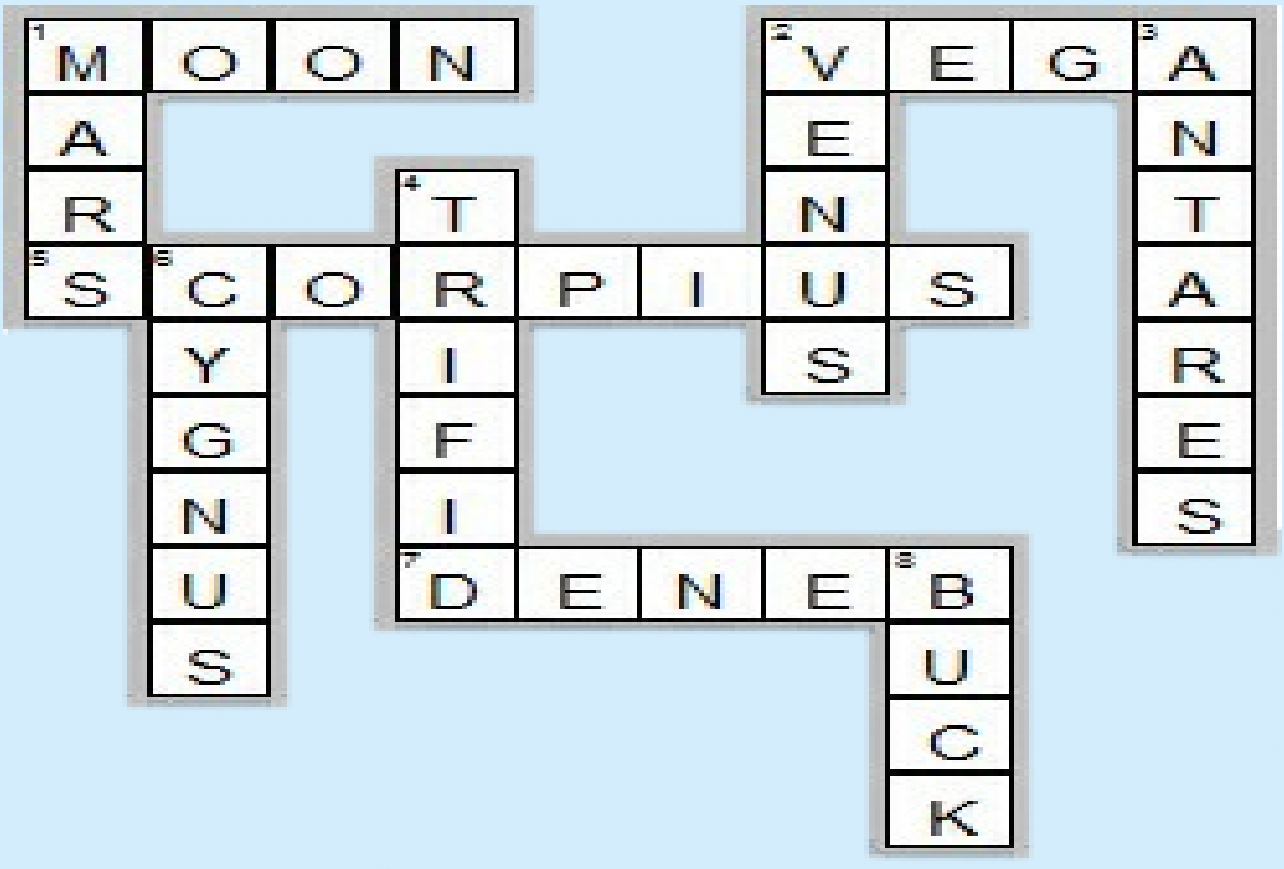


Cartoon Corner by Alexandra Tekatch

Meteor Shower



Answers to Astronomy Crossword on Page 12



UPCOMING EVENTS

September 7, 2012 - 7:30 pm General Meeting at the Hamilton Spectator Auditorium. Our speakers will be Tim Philp and John Gauvreau.
September 22, 2012 - 8:00 pm -11:00pm Public stargazing event at Spencer Smith Park, Burlington, Ontario. See our website for details.
September 29, 2012 - Cosmology Discussion Group meets at 7:30 pm in the basement of Centurion Apartment building in Dundas. Contact Jim Wamsley for directions or more information: 905-627-4323.
October 12, 2012 - 7:30 pm Annual General Meeting at the Hamilton Spectator Auditorium.
October 27, 2012 - 7:30 pm *new* Astrophotography Group meets. More information in next month's newsletter.

2011-2012 Council

Chair	Bob Christmas
Second Chair	Don Pullen
Treasurer	Steve Germann
Membership Director	Matthew Mannering
Observing Director	John Gauvreau
Event Horizon Editor	Ann Tekatch
Webmaster	Don Pullen
Recorder	Mike Jefferson
Secretary	Jim Wamsley
Public Education	Mario Carr
Councillors at Large	Harvey Garden Brenda Frederick Joe McArdle Doug Black David Tym Keith Mann

Observing site for the HAA provided with the generous support of the
Binbrook Conservation Area
Come observing with the HAA and see what a great location this is for stargazing, a family day or an outdoor function.
Please consider purchasing a season's pass for $79 to help support the park.
http://www.npca.ca/conservation-areas/binbrook/
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