Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 10 No. 9 Sept 2016

This month's constellation page (pg 12) features four small constellations that you have passed through looking for targets like M15 or the Dumbbell Nebula. Delphinus and Sagitta above are easy but see if you can recognize in the sky the two less obvious constellations Vulpecula and Equuleus next time you are out. Graphic from SN Pro 6.

Sept 2016 Contents

Starfest Report

The 2016 version of Starfest has once again sent many amateur astronomers home happy. Even the professional astronomers who were present giving talks got a chance to do some serious stargazing and get a little closer to their subject matter.

"Real" astronomers (folks who actually get paid working in the field) supported the theme for Starfest this year which was "BIG Astronomy". The talks covered a lot of astronomical BIG things: everything from the biggest structures in the universe (super-clusters of galaxies) to the BIG 30-m telescope being proposed for Mauna Kea. I especially related to Dr. Christine Wilson's keynote talk on Saturday evening about the Atacama Large Millimetre Array (ALMA) of radio telescopes in the Atacama Desert in Chile. In 2011, on a Sky News sponsored trip to the Chilean desert for stargazing, I was able to see the facility on the mountain side from the Atacama Lodge near San Pedro de Atacama where we stayed. I also met three of the participants from that trip during the weekend.

Also memorable was the talk given by Dr. Marshall McCall of the physics Department at York University that directly tackled the theme of the conference. Just what do we mean by BIG? He sorted out the different things we mean in an entertaining way. He referred to "apparent" bigness vs "inherent" bigness and explained that the first was just a matter of placement: -galaxies like M31 can appear "small" because it is far away while inherently it is a very large object several hundred light years across. Many things which we cannot see like clusters of galaxies are actually intrinsically BIG and appear insignificantly tiny to our naked eye, even with telescopic aid.

A sad note at Starfest was the announcement that John Clemmer passed away suddenly on June 21, 2016 at the age of 78. John was a former member of BAS. He worked a graphic designer and did a number of the programs for Starfest over the years. If you bought a Starfest T-shirt in the last ten years you probably have one of his designs on it.

A celebration of his life will be held at the Durham Art Gallery Sep 19 from 2 to 4 pm.

Continuing the theme of BIG, Dr. Anthony J. Noble, part of a team that uses the Sudbury Neutrino Observatory (SNO) and its successor SNOLAB, spoke about the Nobel-prize winning research in solar neutrinos and the continuing investigations into these elusive particles as well as dark matter, and supernovas. The BIG in this case comes from the size of the detector used in the original Sudbury Neutrino Observatory, an acrylic sphere 12 m in diameter that held the largest amount of heavy water ever used in a detector. And the cost to the SNO team was just one dollar (actual retail value $330 million.) Atomic Energy of Canada with large stockpiles of heavy water for CANDU reactors, loaned them the 1000 tonnes needed for the detector. That paid off in a Nobel Prize in 2015 for Art McDonald and Takaaki Kajita for work which solved the solar neutrino problem by showing that solar neutrinos changed "flavour" on the trip from Sun to Earth. And yes, it's coincidence that Prof. Noble was on the team that won the Nobel Prize. (cont'd pg 2)

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Starfest Recap (cont'd)

As for BIG in the world of optical telescopes, the biggest currently underway is the TMT (Thirty Metre Telescope) and in keeping with the dimensions of the project, it is having BIG teething pains. Dr. Ray Carlberg (U of T Astronomy Dept) explained how activity has ground to a halt after 8 years of planning and initial construction of components at various facilities all over the world, including a novel enclosure which is the Canadian contribution by Empire Dynamic Structures of Coquitlam, BC. The proposed site on Mauna Kea has been placed into question by a local protest group (the mountain is considered sacred ground by Hawaiians and has an endangered species living there as well) and the TMT consortium has had its building permit revoked! Support among the general public is substantially in favour of the project, but to be safe, the consortium is looking at a possible move to another location, possibly the Canary Islands or the Atacama Desert. Incidentally, Mt. Kobau near Osoyoos in BC is not on the short list of alternate sites. In order to exploit the telescope design, the atmosphere must let as much infra-red light through as possible and the air column above Mt Kobau, (elev. 1873 m) is still too thick. (Mauna Kea is at 4205 m).

One of the talks, the talk on the ROM meteorite collection could be charitably described as "average". Maybe we have become used to great talks at Starfest and the less-than-great ones then pale by comparison. After the talk, I did get more information about the Southampton pallasite that was discovered by London ON rock collector Carl Young in 2001. The ROM has the largest part (3.1 kg) in its collection and according to the speaker Ian Nicklin, paid Young for the main mass which was originally 3.58 kg. There is a type specimen of 175.6 grams at UWO which Young apparently donated to the meteor department at the university upon his death. This is only the third pallasite ever found in Canada and one of only 89 pallasites in collections in the world. Metallic nickel is a large part of the makeup.

Right: Cross section Young's meteorite. Samples were analyzed by UWO and ROM meteor specialists and a paper published in 2012, available here: https://www.researchgate.net/publication/237169666_Southampton_Canada%27s_third_pallasite

Astronomy Events: Sept 2016

Event times in DST with 24-h clock unless indicated otherwise

Sep	1	Thu	04:03	NM
			04:07	**Annular Solar Eclipse (crosses Africa, Madagascar, Indian Ocean)**
	2	Fri	10:16	Neptune at Opposition
	3	Sat	05:33	Venus 1.2° S of Moon
	4	Sun	14:56	Spica 6.4° S of Moon
			15:05	Saturn 6.1° N of Antares
	6	Tue	13:44	Moon at Apogee: 405 100 km
	8	Thu	16:23	Saturn 4.2° S of Moon
	9	Fri	06:49	FQ
	16	Fri	13:54	Penumbral Lunar Eclipse
			14:05	FM
	18	Sun	10:15	Spica 2.4° N of Venus
			12:00	Moon at Perigee: 361 900 km
	21	Wed	17:13	Aldebaran 0.2° S of Moon (Close miss below local horizon)
	22	Thu	09:21	Autumnal Equinox
	23	Fri	04:56	LQ
	27	Tue	17:32	Regulus 1.8° N of Moon
	28	Wed		**Mars 1.5° S of Lagoon Nebula M8**
			13:59	**Mercury Greatest Elongation West: 17.9°**
	30	Fri	19:12	NM

BAS Club Events: Sept 2016

Sep	**1**	**Thu**	**NM**
	3	**Sat**	**Fox Dark of Moon viewing (BAS members and guests)**
	7	**Wed**	**Regular Meeting at Fox Obs**
			Topic: Beginner's Astrophoto Hints: Brett T.
	17	**Sat**	**5th Anniversary ES Fox Obs Celebration!**

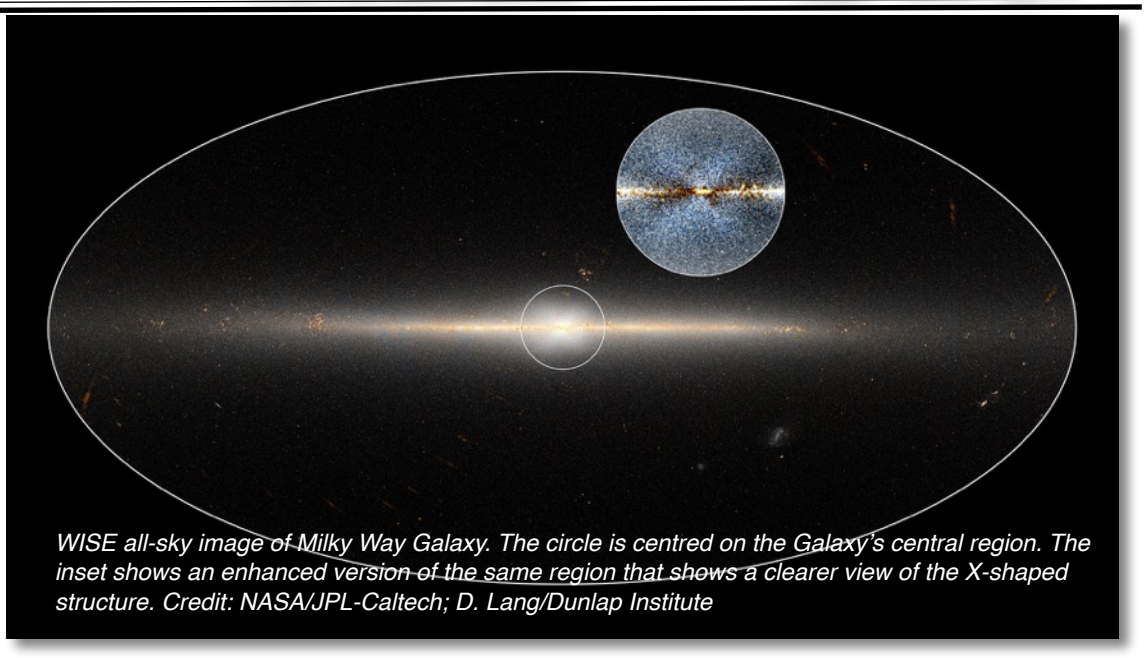
Fox Observatory is 5 years old!

Join us for some cake at the Fox Observatory at noon on Saturday Sep 17. All members are welcome to come by for a celebration piece of cake and coffee. We have a small presentation to make to the ES Fox folks (a rep will be there) but it will be a low key event. No politician speeches or anything like that. Just a chance to say "Thanks!" to ES Fox.

X Marks the Spot at the MW Centre

-press release

Dunlap Institute for Astronomy & Astrophysics, University of Toronto



WISE all-sky image of Milky Way Galaxy. The circle is centred on the Galaxy's central region. The inset shows an enhanced version of the same region that shows a clearer view of the X-shaped structure. Credit: NASA/JPL-Caltech; D. Lang/Dunlap Institute

TORONTO [For Immediate Release] Two astronomers—with the help of Twitter—have uncovered the strongest evidence yet that an enormous X-shaped structure made of stars lies within the central bulge of the Milky Way Galaxy.

Previous computer models, observations of other galaxies, and observations of our own galaxy have suggested that the X-shaped structure existed. But no one had observed it directly; and some astronomers argued that previous research that pointed indirectly to the existence of the X could be explained in other ways.

"There was controversy about whether the X-shaped structure existed," says Dustin Lang, a Research Associate at the Dunlap Institute for Astronomy & Astrophysics, University of Toronto, and co-author of the paper describing the discovery. "But our paper gives a good view of the core of our own galaxy. I think it has provided pretty good evidence for the existence of the X-shaped structure."

The results appear in the July issue of the Astronomical Journal. The lead author is Melissa Ness, a postdoctoral researcher at the Max Planck Institute for Astronomy in Heidelberg.

The Milky Way Galaxy is a barred spiral galaxy: a disk-shaped collection of dust, gas and billions of stars, 100,000 light-years in diameter. It is far from a simple disk structure, being comprised of two spiral arms, a bar-shaped feature that runs through its centre, and a central bulge of stars. The central bulge, like other barred galaxy's bulges, resembles a rectangular box or peanut when viewed—as we view it—from within the plane of the galaxy. The X-shaped structure is an integral component of the bulge.

Astronomers think the bulge could have formed in two different ways: it may have formed when the Milky Way Galaxy merged with other galaxies; or it may have formed without the help of external influences as an outgrowth of the bar, which itself forms from the evolving galactic disk. Lang and Ness's finding supports the latter model which predicts the box- or peanut-shaped bulge and the galactic X.

This latest, clearest view of the bulge emerged when Lang re-analyzed previously released data from the Wide-field Infrared Survey Explorer (WISE), a space telescope launched by NASA in 2009. Before ending its initial mission in 2011, WISE surveyed the entire sky in infrared—imaging three-quarters of a billion galaxies, stars and asteroids.

"The bulge is a key signature of formation of the Milky Way Galaxy," says Ness. "If we understand the bulge we will understand the key processes that have formed and shaped our galaxy."

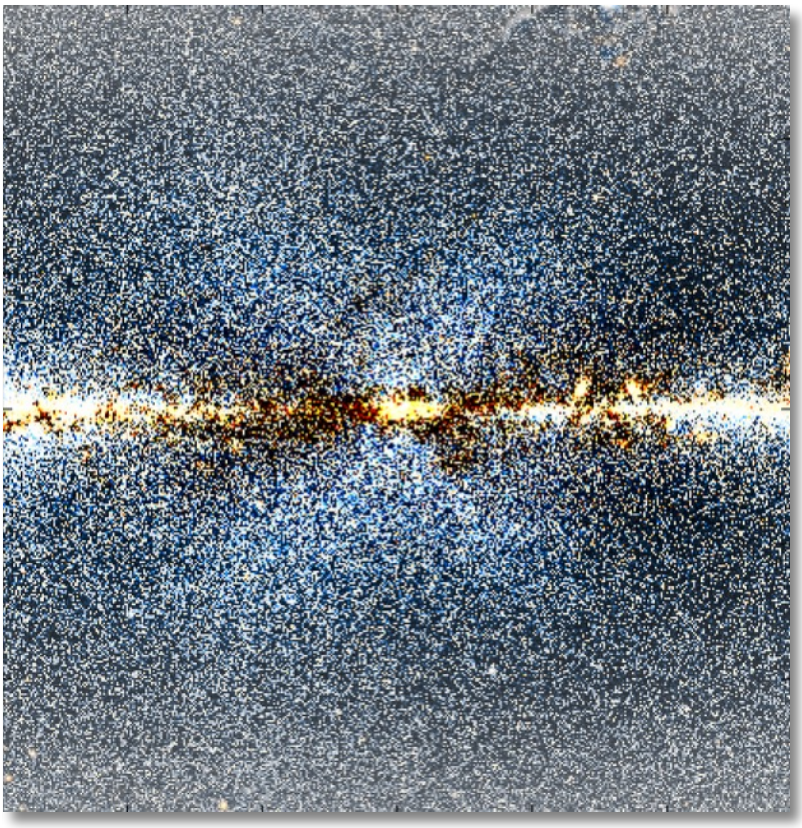
"The shape of the bulge tells us about how it has formed. We see the X-shape and boxy morphology so clearly in the WISE image and this demonstrates that internal formation processes have been the ones driving the bulge formation."

It is also evidence that our galaxy did not experience major merging events since the bulge formed. If it had, interactions with other galaxies would have disrupted its shape.

Lang's analysis was originally intended to aid in his research in mapping the web of galaxies beyond the Milky Way Galaxy. To help explore the maps he'd developed from the WISE data, he created an interactive map-browsing website and tweeted an image of the entire sky.

"Ness saw the tweet and immediately recognized the importance of the X-shaped structure," says Lang. "We arranged to meet at an upcoming conference we were both attending. The paper was born from that meeting. That's the power of large surveys and open science!"

Below: *An enhanced, close-up view centred on the Galaxy's bulge and the blue-tinted "X." Credit: D. Lang/Dunlap Institute*



Jupiter's Red Spot is a Real Hot Spot from physicsworld.com

Jupiter's Great Red Spot – the largest and longest-persisting storm in the solar system – may provide the energy required to heat the planet's upper atmosphere to the unusually high values observed. So says an international team of astronomers, who believe they have found that the atmosphere above the storm is hundreds of degrees hotter than anywhere else on the planet.

Thanks to our relative proximity to the Sun, the Earth is efficiently warmed by solar energy. Indeed, both the surface and the atmosphere of our planet is heated by sunlight, up to altitudes as high as 400 km, where the International Space Station orbits. On the other hand, Jupiter is more than five times more distant from the Sun, and yet its upper atmosphere has average temperatures that are comparable to those of Earth. Indeed, the temperatures of the upper atmospheres of all of the solar system's giant planets are much hotter than would be expected if the Sun were their only heat source. This anomaly was first noticed nearly 40 years ago, and has since been dubbed the giant-planet "energy crisis". But an actual energy source, beyond sunlight, has evaded scientists.

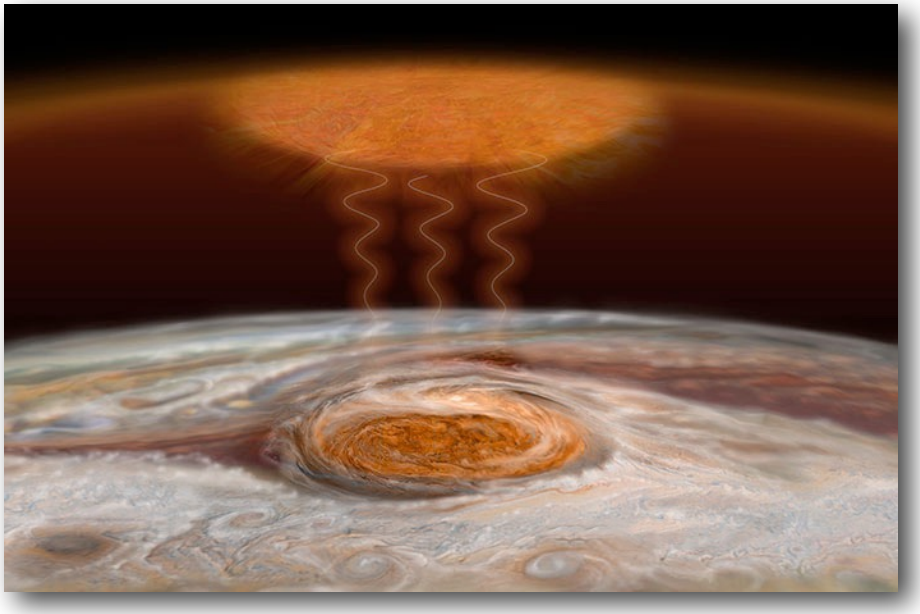


Illustration depicting the mechanism of heating from the Great Red Spot. (Courtesy: Karen Teramura, UH IfA, James O'Donoghue)

Hot at the poles

For Jupiter specifically, it is known that the planet's powerful aurorae at the poles impart nearly 200 GW per hemisphere into the atmosphere, which explains the temperatures measured in those areas. However, for the low to mid-latitudes of Jupiter, no such source has been identified. This is despite the fact that the temperature measured there is nearly 800 K, which is 600 K warmer than it should be if the planet was merely heated by the Sun.

Now though, thanks to new observations of the Jovian atmosphere above the Great Red Spot (GRS), James O'Donoghue and Luke Moore at Boston University in the US, together with Tom Stallard and Henrik Melin at the University of Leicester in the UK, suggest that it is the storm driving the planet's atmospheric heating. After ruling out solar heating from above, the team "designed observations to map the heat distribution over the entire planet in search for any temperature anomalies that might yield clues as to where the energy is coming from", says O'Donoghue.

Stormy coincidence or clue?

In December 2012, the team observed Jupiter for nine hours using the SpeX spectrometer on the NASA Infrared Telescope Facility. A Jovian day itself is rather short – a measly 9 hours and 56 minutes – thanks to the planet's quick spin. The planet-wide infrared emissions that the team observed showed that much-higher-than-expected temperatures exist at high altitudes. "We could see almost immediately that our maximum temperatures at high altitudes were above the Great Red Spot far below," says O'Donoghue, adding that the team immediately wondered if this was a "weird coincidence or a major clue"?

Hotting up

The GRS storm has been raging for more than three centuries – while its size and colour has fluctuated over time, it is so big it could swallow Venus, and has winds that take six days to complete one spin. The atmosphere above the storm is on average 1600 K hotter than anywhere else on the planet, including the auroral region. Until their recent observations, there was no evidence that linked this huge powerhouse to the heated upper atmosphere, according to the researchers.

"Energy transfer to the upper atmosphere from below has been simulated for planetary atmospheres, but not yet backed up by observations," O'Donoghue says. "The extremely high temperatures observed above the storm appear to be the 'smoking gun' of this energy transfer, indicating that planet-wide heating is a plausible explanation for the 'energy crisis'," he adds. The researchers concluded that, if sufficient heating does not come from above (i.e. via the Sun) and there is no heating *in situ* via magnetospheric interactions (like with the aurorae), then by a process of elimination, it must come from below.

Sizzling sounds

As to the mechanism via which this energy is imparted, O'Donoghue and colleagues deduce that the storm produces acoustic waves – which are vertically propagated from the lower atmosphere – that deposit their energy, via viscous dissipation, into the upper atmosphere. Acoustic waves are routinely produced above thunderstorms and this kind of effect has been observed on Earth above the Andes mountains. Indeed, this method has been previously suggested for Jupiter, with models suggesting that hundreds of degrees of heating could be imparted this way. But this is the first direct observation of a localized source of heating, which clearly links the upper and lower atmosphere, according to the researchers.

"This fantastic result, showing how the upper atmosphere is heated from below, was produced directly from Leicester's 2012 observing campaign, which was designed to try and answer why Jupiter's upper atmosphere is so hot," says Stallard. He adds that the Juno mission, which reached the planet earlier this month, "will be measuring the aurora and its sources, and we expected the auroral energy to flow from the pole to the equator. Instead, we find the equator appears to be heated from plumes of energy coming from Jupiter's vast equatorial storms."

The research is published in *Nature*.

About the author

Tushna Commissariat is a reporter for *physicsworld.com*

BAS Astro-imagers Take on Summer Messier Objects

The summer Milky Way in Sagittarius and Scorpius holds about a third of all the Messier objects catalogued and with its rich stellar background is an ideal place to take images. The down side is of course, the fact that it is above the horizon for such a short time and with the vagaries of clouds and moonlight, getting good "data" for a Messier object is a combination of luck, perseverance and dedication. Our BAS astrophotographers have the latter two characteristics in spades and take advantage of the clear skies (luck) just like the rest of us. I am always pleased that they allow their work to be displayed in SGN.

M17: Omega Nebula [total 5 hours of exposure!]
From Frank Williams: *Worked on swan nebula M17 during Starfest week from my little observatory in Allenford, and with cloudy weather here got to processing it. This has Luminance 1 hour, red filter 90 minutes, blue and green filters 75 min; 140 mm TEC apo [refractor] sbig STL 11000 camera cooled to -20C (As cold as I could get it running peltier cooler flat out) Processed in Pixinsight, Slight crop.*

Frank also targeted the **Veil Nebula**, which is too big for most telescopes at 3 degrees (6 FM widths!). It is so large it has several NGC designations, -NGC 6992 is shown at right.
Frank was doing a side-by-side comparison of two lenses (in different price ranges) on the same target, using two Canon cameras, a T2i. and a 6D. The latter camera coupled with the more expensive lens won out as expected. Images were a stack of 10 3 min exposures at 1600 iso, on a Losmandy Titan mount on the same night (July 4). The lens was a 200 mm f/2.8. The image right shows the image with the 2.8 lens on the 6D camera.

Frank Williams images from his Sky Pod near Allenford and sent in this nice wide field image of the area west of Antares (left). Both M4 (aka Cat's Eye Cluster) and the smaller globular NGC 6144 show up beautifully. He writes:
Mars gets all the love, but Antares, Mars' rival, is very colourful too. I need a wider field camera lens or telescope to get all the colour here but this is what I have to work with so far. Over [the] last couple nights [I] got an hour luminosity, and 30 minutes each of Red Green and Blue (no H-alpha yet, just got that filter).

NGC 6144 is three times farther away than M4.

Robert Atkinson sent in this image he took from Starfest on Friday night as the Crescent Moon was setting. Jupiter is in the upper left corner. Image was shot at 1/200 sec ISO 800 f/2 @ 85mm with a Canon 85mm f/1.8 lens and cropped. Friday night viewing was mostly cloudy until after midnight when it cleared.

♫GREAT BALLS OF (Perseid) FIRE♫ (apologies to Jerry Lee Lewis)

From Lorraine Rodgers:
John,
I saw a lovely fireball while driving home from Starfest very late Friday night. Actually, it was Sat Aug 6 at 2:09am. It went right thru the bowl of the Big Dipper, and was right in my view driving north, framed in the centre of the highway. Brett said it lit up the [Starfest] campground.

Aug 10th we were at the Fox. After midnight (now the 11th), we saw meteors now and then. By 1am the moon was well below the horizon and the meteors began to pick up, especially in the southern Milky Way sky. Of course it was when we were all packed up and leaving.
As for Aug 11/12, it was [mostly] cloudy…
Lorraine

From Brett Tatton
There was a fireball earlier in the week...I and a couple other Port Elgin people saw it...Low and slow...with a spark near the end…
Monday August 8th midnight or shortly after on Tuesday am...pointed it out to some kids on the board walk. I was at Southampton and the fireball was south to southwest.

Does that heading jibe with the OS harbour orientation? [This in reference to an image of a fireball over Owen Sound harbour that turned out to be fake.-ed]
Brett

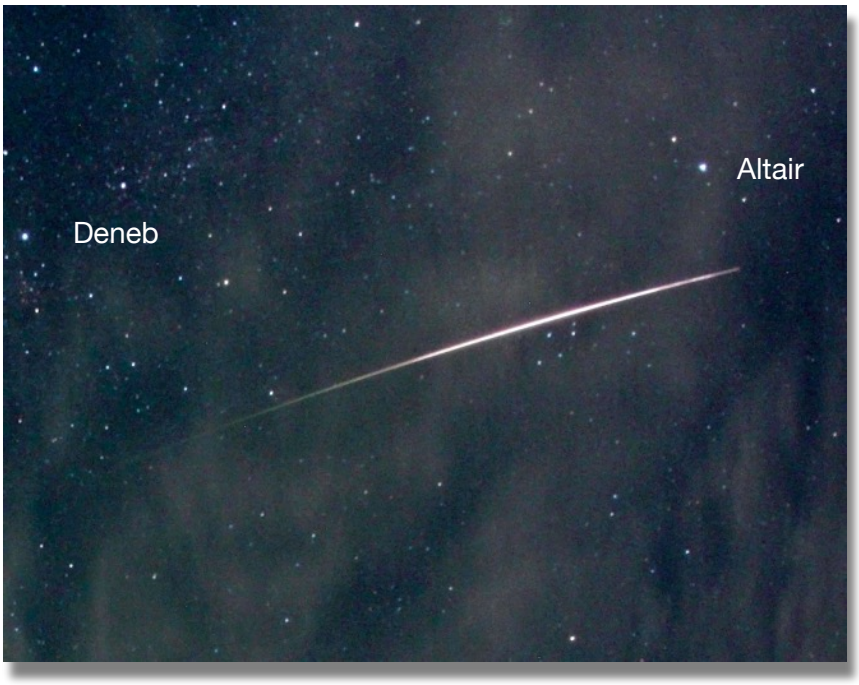
From Martie Barth:
Hi John,
I was out around 3:30 am for a short while. I saw 3 meteors. The damp and a sore neck drove me inside again. Conditions were somewhat variable with high, light clouds going by but for the most part, I could see pretty well. I saw 31 (confirmed, perhaps more possibles) in about 40 minutes on the morning of the 12th between 1:50 am and 2:30 am. I woke Harry who came out for about 20 minutes but the clouds rolled in so we gave up.
Martie

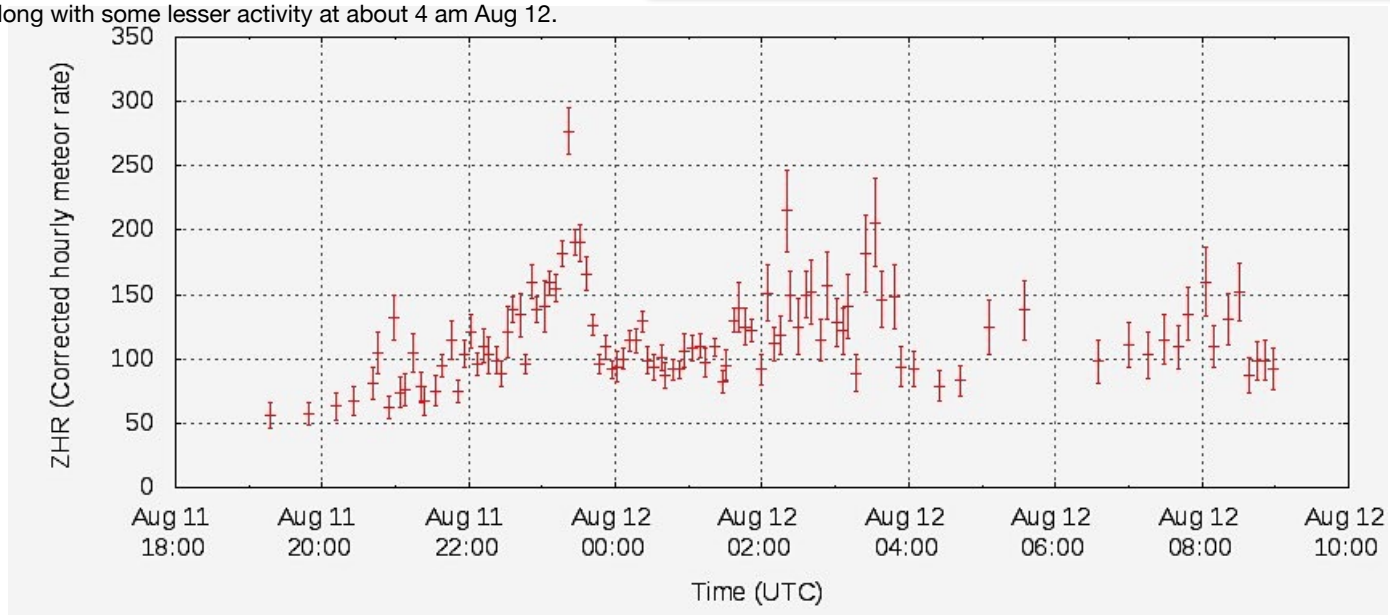
Perseid 2016 Report

Perseids never fail to put on a great show and it would have been better if clouds had not appeared on the peak night. Still a very bright fireball (the brighter of two -see next page) was caught at 12:39 am Aug 12. It traced a glowing path about 40 degrees long parallel to the hypotenuse of the Summer Triangle. The separation of Deneb and Altair in the sky is 38° and the trail is at least that long. Visually, it faded some just above Delphinus and then brightened again before burning out. Later examination of subsequent frames showed a persistent trail visible for at least 40 seconds. Magnitude at maximum was estimated to be -6 to -8. I have never seen a better example of a Perseid fireball in many years of observing!

Graph below: The IMO (International Meteor Organization) published this detailed graph of Perseid numbers based on observations from 234 observers in 39 countries who recorded 23,581 Perseids. A clear double peak is evident. Final analysis indicates a Zenithal Hourly Rate of 119. A burst of 200/hour occurred at 7:30 pm local time on Aug 11, again about 4 hours later at 11:30 pm along with some lesser activity at about 4 am Aug 12.

Perseid fireball 40° long magnitude -6

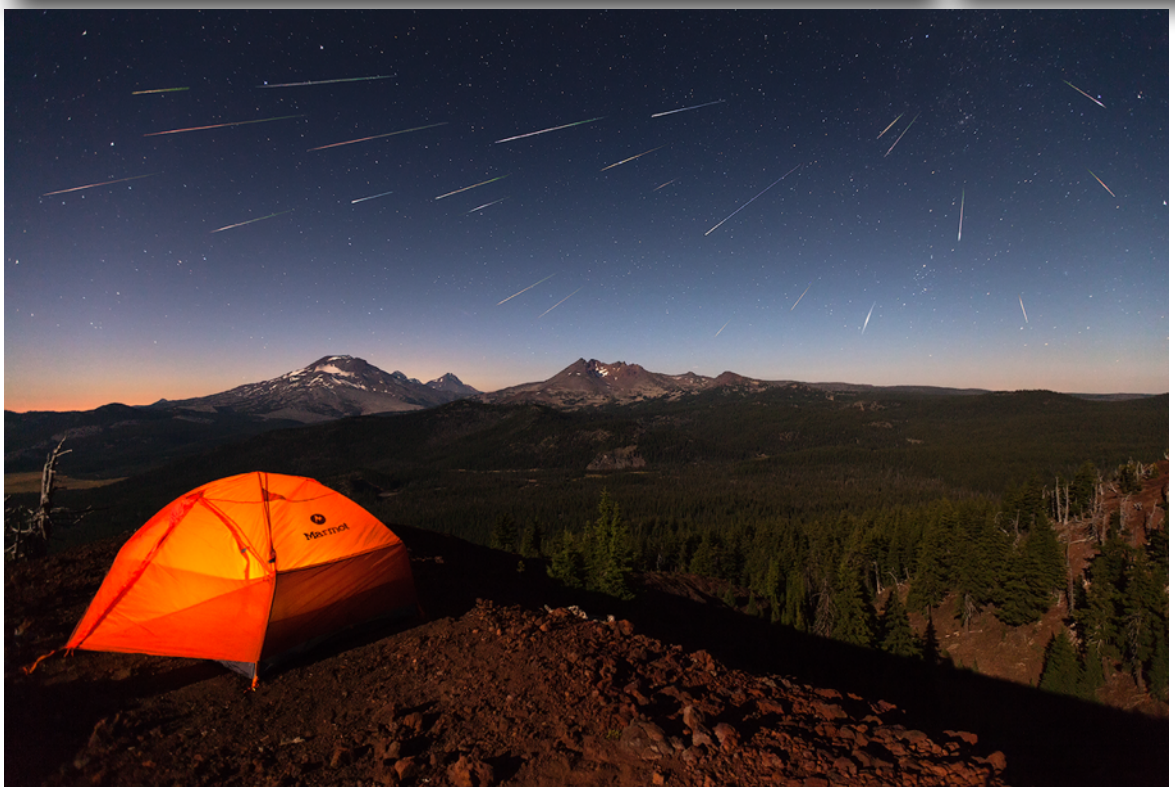




Perseid Fireball plus 3 minute persistent trail!

The Perseids were perking along nicely, thank you, on the evening before peak and early on Aug 11, (Thur am) I caught the first of two nice fireballs (see report on that one on the previous page). This one speared the head of Medusa, the pentagon of stars including bright Algol near the start of the trail. Trail length was about 9° long and brightness was -4 to -6 magnitude. The image below was taken at 2:12:28 am DST (accurate to a few seconds) and there were 10 additional frames (3 shown at right) where glowing gas was visible on the image! The gas cloud broke up into two main parts, then three, and finally faded out after about 3½ minutes. I did not see this one visually as the camera and computer timer did the exposures and I only found it after the fact. Images were taken with a Canon 60Da set at ISO 2500 for 20 second exposures with a 10 mm wide angle lens. This was image #672 of 1233 the camera took Aug 10/11 and there were 591 images more on peak night. Weather on Aug 11/12 was only clear for a few hours after midnight.

Image at 2:13:34 am



From the spaceweather.com Image Gallery:

Images from all over the world send in their photos to spaceweather.com . One that struck my eye was this composite by Jason Brownlee of Bend Oregon. which was taken Aug 11 from the Three Sisters Wilderness Area in Oregon. A quick count shows over 25 trails, all Perseids. The radiant is pretty obvious.

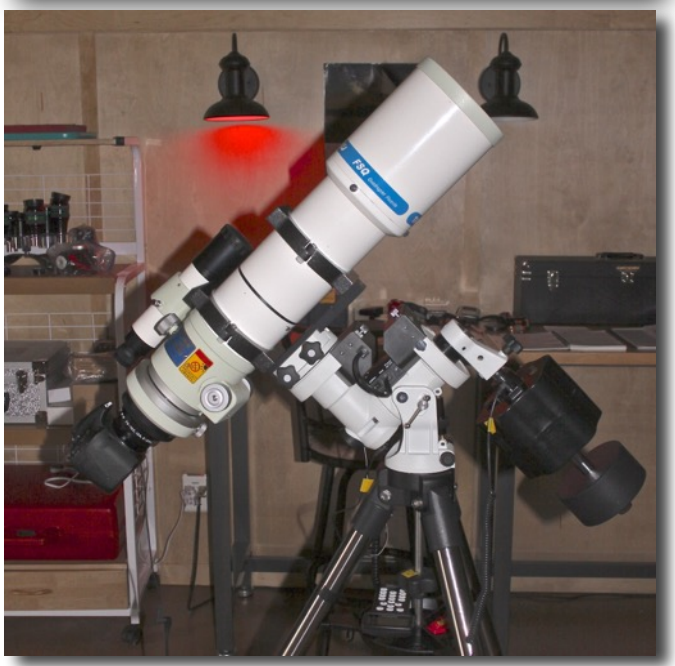
The Mystery of Charles Messier and the Double Cluster

"*One long-lived mystery concerning the Double Cluster is why the 18th Century French comet hunter, Charles Messier, did not include it in his famous catalogue.*"
Stephen J. O'Meara "The Caldwell Objects" -Appendix B-

Paula and I were planning on travelling again to Cayman Brac in January, 2016, and I was searching for a quality, light-weight, and portable telescope mount that could carry my TAK FSQ 106, a Canon 60Da, and a finderscope. My search ended during Starfest, 2015, when I met Steve Mallia, from Bolton, ON, who owns Ontario Telescopes. Steve recommended iOptron's ZEQ25 mount; a portable, "Centre Balanced Equatorial" mount. This unique design places the payload weight at the centre of gravity of the mount and has a load capacity of 27 pounds. This mount seemed ideal for me and, because it only weighed 10.4 pounds, it would be fairly airport friendly! In addition, even with my TAK FSQ 106 attached to it, I would have a light weight, wide field (5 degrees) imaging platform.

The more I learned about this mount, the better I liked it. Among other things, it came with a dual-axis servo-motor with optical encoder, a dark-field illuminated and calibrated polar scope, a 32 channel GPS, a Go2Nova Hand Control with a data base of over 59,000 objects, an Integrated ST4 autoguiding port, a serial port for computer control, and a 1.5 inch stainless steel tripod. I paid $929 plus tax for this mount and also added an iOptron hard case for the mount head, a carrying case for the tripod, and a rechargeable battery pack that, amazingly, doubles as a counterweight and it still provides for 4 nights of operations before needing recharging!

Which brings me to the mystery of the famous Double Cluster in Perseus. The summer of 2016 is becoming famous for its high daytime heat and humidity, its heavy dewing at night, and, more often than not, overcast, cloudy skies! Getting four nights in a row to do any kind of astronomy is a challenge. But, not all nights are terrible. On August 9, we had clear skies over the Bruce Peninsula, and Paula and I were spending a few days at our cottage. It was 11:20 PM DST and the Milky Way star clouds over our Four Elements Observatory at Little Pine Tree Harbour were nicely defined. Paula was enjoying her Celestron CPC 9.25 as it slewed to many colourful double stars. I decided to take some wide field, deep sky images with the wide field imaging platform I described in the opening paragraph. The Perseus Double Cluster was now positioned above the NE corner of the observatory's roll-off roof and presented a tempting target. Even with the naked eye, this cluster grouping has such an attractive visual effect that it is surprising that Charles Messier did not include it in his catalogue of objects that were not to be confused with comets. Here is my August 9th image of the Perseus Double Cluster.



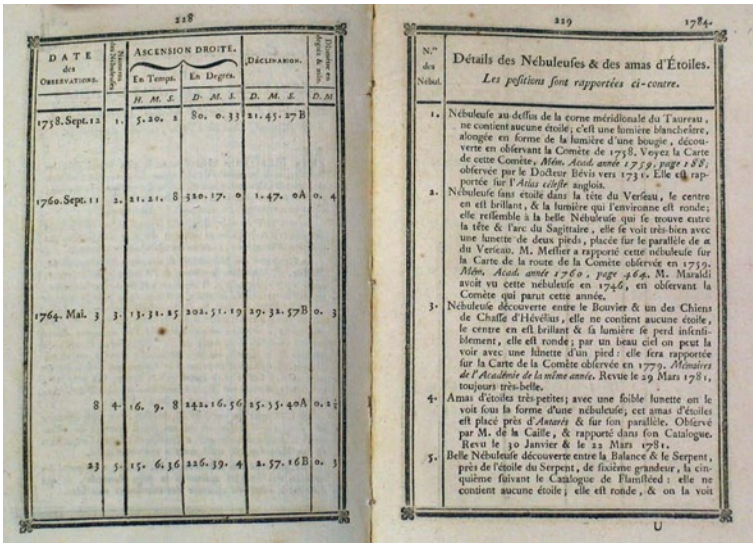
Above: *Light weight, wide-field, imaging platform, TAK FSQ 106, iOptron ZEQ 25 and Canon 60Da. The large black counterweight is actually a rechargeable battery. Notice the Unique "Z" Configuration of mount head. Cunningham Photo*

Right: *Perseus' Double Cluster, Imaged from Four Elements Observatory Canon 60Da, TAK FSQ 106, iOptron ZEQ 25 Mount, Cunningham Photo, 142 seconds Exposure @ 3200 ISO August 9th, 2016*

Most of the readers of this column probably know that the Perseus Double Cluster originated from the same cloud of gas and dust about 12.8 million years ago. These clusters are located 7,500 ly distant in the Perseus Spiral Arm and taken together they occupy, on the celestial sphere, an area slightly larger than two full moons. The last time I had imaged these clusters was many years ago from our Quetican observatory in Lion's Head. On this August night, the ZEQ 25 Go2Nova Hand Control placed the Double Cluster in the middle of my camera's FOV and I took a 142 second unguided exposure at 3200 ISO.

My image above shows NGC 869 (having 3700 solar masses) on the top, while NGC 884 (having 2800 solar masses) is positioned below it. On my computer monitor I found the displayed image quite pleasing. The Double Cluster's stars were crisp, displaying no trailing, and I liked the subtle colours of the brightest stars which were sprinkled across the camera's FOV. Attractive blue and red supergiants were also visible and, within NGC 884, I could see the orange-red semi-regular variable star, RS Persei. This large and cool star is 70,000 times as luminous as our Sun and has a radius 700 times that of our Sun. Current photometric measurements reveal that RS Persei fluctuates between 7.8 Mv and 10.0 Mv with a period of about 224 days. The only telescopic view I have had of the Double Cluster that came close to what I was seeing on my computer's screen was with John Lash's 6 inch Astro Physics refractor when he invited Paula and myself to visit his Kincardine observatory one fall night after a BCAS meeting.

Charles Messier



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DATE des Observations.	Ascension droite. En Temps. H. M. S.	Ascension droite. En Degrés. D. M. S.	Déclinaison. D. M. S.
1758. Sept. 12	1. 5. 20. 2	80. 0. 33	21. 45. 27 B
1760. Sept. 11	2. 21. 21. 8	320. 17. 0	1. 47. 0 A
1764. Mai. 3	3. 13. 31. 25	202. 51. 19	29. 32. 57 B
8	4. 16. 9. 8	242. 16. 56	25. 55. 40 A
23	5. 15. 6. 36	226. 39. 4	2. 57. 16 B

229 1784.

N.° des Nébul.	Détails des Nébuleuses & des amas d'Étoiles. *Les positions sont rapportées ci-contre.*
1.	Nébuleuse au-dessus de la corne méridionale du Taureau, ne contient aucune étoile; c'est une lumière blanchâtre, allongée en forme de la lumière d'une bougie, découverte en observant la Comète de 1758. Voyez la Carte de cette Comète, *Mém. Acad. année 1759, page 188*; observée par le Docteur Bévis vers 1731. Elle est rapportée sur l'*Atlas céleste* anglois.
2.	Nébuleuse sans étoile dans la tête du Verseau, le centre en est brillant, & la lumière qui l'environne est ronde; elle ressemble à la belle Nébuleuse qui se trouve entre la tête & l'arc du Sagittaire, elle se voit très-bien avec une lunette de deux pieds, placée sur le parallèle de α du Verseau. M. Messier a rapporté cette nébuleuse sur la Carte de la route de la Comète observée en 1759. *Mém. Acad. année 1760, page 464.* M. Maraldi avoit vu cette nébuleuse en 1746, en observant la Comète qui parut cette année.
3.	Nébuleuse découverte entre le Bouvier & un des Chiens de Chasse d'Hévélius, elle ne contient aucune étoile, le centre en est brillant & sa lumière se perd insensiblement, elle est ronde; par un beau ciel on peut la voir avec une lunette d'un pied: elle sera rapportée sur la Carte de la Comète observée en 1779. *Mémoires de l'Académie de la même année.* Revue le 29 Mars 1781, toujours très-belle.
4.	Amas d'étoiles très-petites; avec une foible lunette on le voit sous la forme d'une nébuleuse; cet amas d'étoiles est placé près d'*Antarès* & sur son parallèle. Observé par M. de la Caille, & rapporté dans son Catalogue. Revu le 30 Janvier & le 22 Mars 1781.
5.	Belle Nébuleuse découverte entre la Balance & le Serpent, près de l'étoile du Serpent, de sixième grandeur, la cinquième suivant le Catalogue de Flamsteed: elle ne contient aucune étoile; elle est ronde, & on la voit

U

Messier's published catalogue [Wikipedia images]

I then directed the ZEQ 25 to place M31 in the 60Da's FOV and took another image. I thought to myself, here was M31, M32, and M110, all revealed in the same FOV. All wonderful objects, of course, and Charles Messier had included them in his catalogue. **So, why didn't he include the Perseus Double Cluster in the same catalogue**? After all, he had included the Pleiades Cluster, M45; the fainter Beehive Cluster, M44; and the Lagoon Nebula, M8 in the catalogue.

In 2002, Stephen James O'Meara authored a book on the Caldwell Objects. The Perseus Double Cluster is assigned a Caldwell number 14. At the back of the book are a number of engaging Appendices but, one in particular, was entitled "Why Messier Did Not Include the Double Cluster", and O'Meara addresses this mystery. In about five pages, O'Meara solves, to my satisfaction, the mystery of the missing Double Cluster from the Messier Catalogue. I highly recommend reading it! O'Meara's solution, quite simply, revolves around three ideas.

First, contrary to popular wisdom, Messier's catalogue is not a listing of the best and brightest celestial objects in the heavens. It is primarily a listing of objects that could be confused as comets by comet hunters of the day. Imagine the wasted time if a comet hunter comes across a "faint fuzzy" for the first time. The comet hunter will have to wait until the object shows some motion against the background stars. With the vagaries of weather, coupled with poor optics, the confirmation might take a few days at least. Imagine the frustration when the comet hunter finds out that the tentative comet is not one at all but a more distant nebula, cluster, or galaxy!

O'Meara's second idea is the "Haystack Idea". To find a new comet, you have to catch it when it is brightest and hopefully largest in size; in particular, when it is closest to the Sun. So, to maximize the odds of finding a comet, the searchers would focus their attention on a "**Haystack Region**" of sky centered along the ecliptic and close to the point on the horizon of the setting or rising Sun. After sunset, the searcher then sweeps this area of sky along the horizon about 45 degrees north and south of this sunset point. After completing the sweep, the comet hunter raises the telescope about ½ the field diameter and sweeps backward towards the starting point. The comet hunter continues this procedure until the scope is 45 degrees in altitude above the horizon. For morning sweeps, the comet hunter starts high at 45 degrees above the sunrise point and sweeps down toward that point, again sweeping north and south of the ecliptic until sunrise. It turns out that the Double Cluster is nowhere near the Haystack Region so dedicated comet hunters would not have run across it.

Lastly, **O'Meara's third idea concerns the Declination of the Double Cluster itself**. From Messier's latitude of 50 degrees, the Double Cluster is circumpolar; that is, it never sets, so, whether it is rising higher or lower in its circumpolar motions, the double cluster can be easily observed as a collection of stars and not a fuzzy comet. Not so with M31, or M44, or M45 when they are observed close to the horizon with the imperfect telescopes of the day. At those low altitudes where seeing and transparency issues are prevalent, these objects can indeed be observed as "faint fuzzies". O'Meara states that he knows of two cases where modern respected comet hunters reported the discovery of a binocular comet in the twilight sky close to the horizon only to be embarrassed when they learned that the new comet was really a rediscovery of M31!

But really, for professional and amateur astronomers alike, whether the Double Cluster is listed in an observing catalogue or not, it is indeed a splendid celestial object that would be noticed without the help of any catalogue. Its appearance in binoculars, and wide field telescopes provide nothing short of a poetic experience. Gerard Manley Hopkins, in his poem, "The Starlight Night", evokes the same emotional connection I have when viewing the Perseus Double Cluster :

"Look at the stars! Look, look up at the skies!
O look at all the fire-folk sitting in the air!
The boroughs, the circle-citadels there!"

BAS member Shawn Nielsen images remotely from the southern hemisphere. His spectacular Triffid image is explained here:

I took this image of M20 using a remote telescope at Siding Springs Observatory. An ASA 16" astrograph with an Apogee 16mp full frame CCD. The image is 240 min total consisting of narrowband data (Ha,O3) and luminance, red, green, and blue channel data. Processed in Pixinsight. In this case for M20, I can't image it from home as other houses (roof tops) block it from view. At the cottage is possible but I have to be more on the beach to do it, not up in the yard. So the New Mexico and Australia telescopes give me some additional freedom to enjoy imaging deepsky objects. Here's a link to a hi-res version https://dl.dropboxusercontent.com/u/94009991/M20-hires-NBLRGBCombination_MLT_LHE_HDRMT_SAT.png

Cheers, Shawn [Nielsen]

Right: M8 Lagoon and M20 Trifid Wide Field
The MW centre with its many Messier objects is always a draw for astrophotographers. The rich star background makes for interesting images even with relatively simple equipment, if you can call a TeleVue refractor and Canon DSLR simple. This 4 inch refractor generates images with pin-point stars across a 3 degree field and it just happens that both the Lagoon Nebula and the Trifid Nebula fit onto the frame of the APC chip of the Canon 60Da. Image right by John H.

A good image these days requires auto-guiding and a polar-aligned mount (like a SkyWatcher AZ-EQ6) as well as good optics. Image right was taken with this setup and was a 155 second single shot at prime focus of the TV-NP101 with effective focal length of 864 mm and ISO 6400 at f/5.4. Both the Lagoon and Trifid show lots of dark dust lanes and fine detail in the cores as well as the extended hydrogen glow around M8.

Sagitta (Sge)

Sagitta is a small constellation, but its four brightest stars form a prominent and easily recognizable shape that really resembles an arrow. It lies about midway between β–Cygni and Altair in Aquila. The constellation lies in the Milky Way; sweeping this area with binoculars is well worthwhile.

DOUBLE STARS

	Mag.	Sep'n (s)	Location	Remarks
ε	5.7-7.7	90	193516	Orange-Green; beautiful
ζ	5.0-8.7	8	194719	Green-Blue
θ	6.3-8.5	12-18	200821	Pale-Yellow-Pale Ashen; triple.

MESSIER OBJECTS (Cyg)

	Mag	Location	Remarks
M 71	-	195219	Globular Cluster.

Other Objects of Interest in Sag

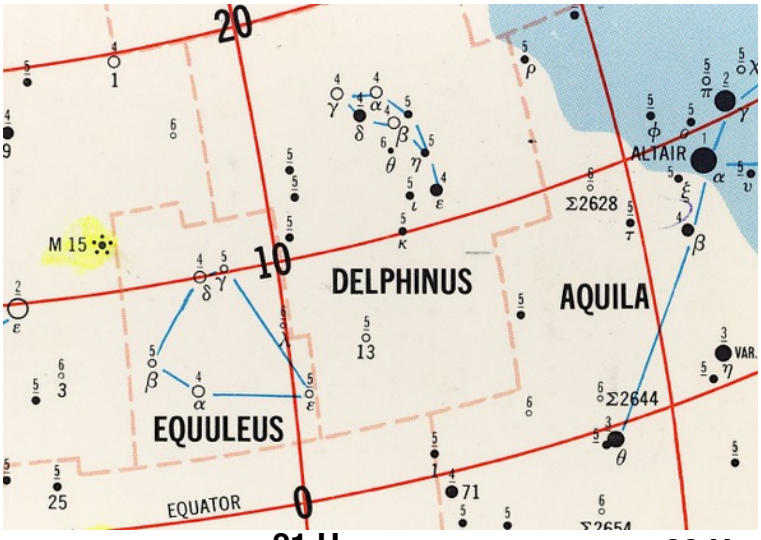
15 Sagittae lies in a beautiful field; just north of this star look for a striking sapphire-coloured star. Scan with low power the areas around η–Sagittae and just north of M 71; these fields contain many beautiful pairs and triples.

Vulpecula (Vul)

Vulpecula is a small, faint constellation south of Cygnus; its brightest star, 13 Vulpeculae has a magnitude of 4.5.

Other Objects of Interest in Vul

T Vulpeculae -short period variable (4 d 10.5 h), magnitude range 5.5-6.5. Location 205028.



Delphinus (Del)

α-Delphini - Sualocin
β-Delphini - Rotanev* note below

Delphinius is an attractive, compact group of five rather faint stars between Sagitta and Equuleus; it takes little imagination to picture a leaping dolphin. This is a splendid area for sweeping with binoculars.

DOUBLE STARS

	Mag.	Sep (s)	Location	Remarks
α	4.0-12.0	43	203716	Yell-Bl Green; beautiful
γ	4.5-5.5	11	204416	

Scan carefully the star fields around θ and ε –Delphini; there are many striking objects in these areas.

Equuleus (Equ)

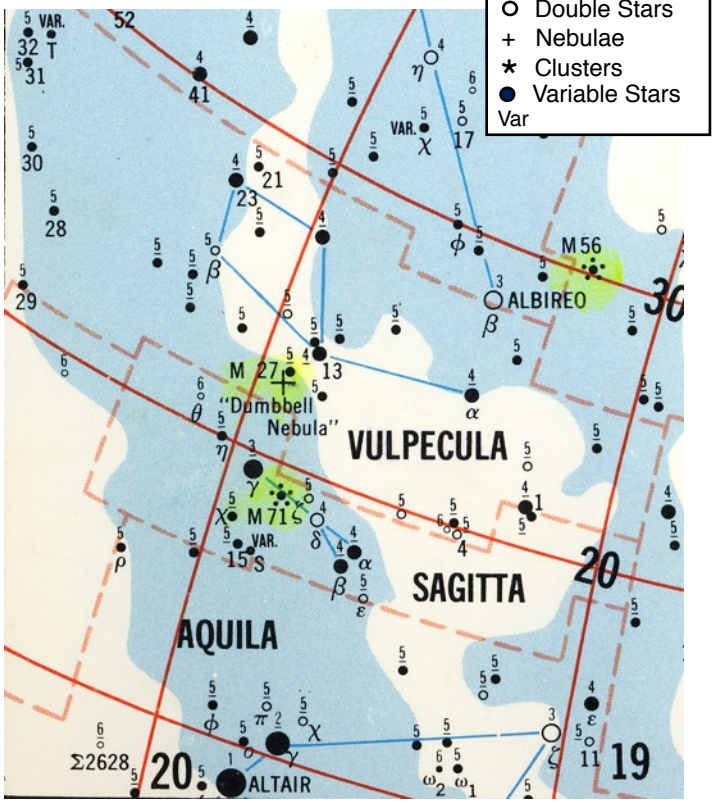
Equuleus is a small asterism of faint stars, the brightest of which, α–Equulei, has a magnitude of 4.1. It is located just to the west of the head of Pegasus, ε–Pegasi.

DOUBLE STARS

	Mag.	Sep (s)	Location	Remarks
β	4.8-11.0	69	212007	
ε	5.7-7.1	11	205704	White-Blue
γ	4.8-11.0	2	210810	
λ	7.1-7.1	3	210007	Both White: a striking pair

Magnitude values are near the star.
Underlined values are half magnitudes.

Chart Legend
- Star Location
- Double Stars
- \+ Nebulae
- ✶ Clusters
- Variable Stars
Var



* **The Strange Story of Rotanev and Sualocin**

* Read both Sualocin and Rotanev backwards and you get "Nicolaus Venator" the Latin form of the Italian name "Niccolo Cacciatore". Cacciatore was Guiseppe Piazzi's assistant in his later years when the famous astronomer nearly lost his eyesight due to an illness. (Piazzi was the first to discover an asteroid -Ceres on Jan 1, 1801). "Venator" and "Cacciatore" both mean "hunter" in their respective languages. Cacciatore decided to name these two stars after himself as he was helping Piazzi compile the Palermo Star Atlas (1814). Whether Cacciatore did this as a joke or felt that his work was not appreciated so he surreptitiously named the stars after himself is not known. He actually deserved honours since he did some serious astronomical work and even after being imprisoned during the Sicilian Revolution in 1820, he survived and re-built the observatory and then headed up the scientific work there for two more decades. He was also an expert on meteorology and wrote a number of books on the subject. He also had a political life, serving as a member of the legislature of the Kingdom of the Two Sicilies. In his personal life, he married, had five children and passed on the directorship of the Palermo Observatory to one of his sons.

Sep	1	Thu	04:03	NM rises locally 6:58 am DST
			04:07	**Annular Solar Eclipse (crosses Africa, Madagascar, Indian Ocean)**
	2	Fri	10:16	Neptune at Opposition
	3	Sat	05:33	Venus 1.2° S of Moon
	4	Sun	14:56	Spica 6.4° S of Moon
			15:05	Saturn 6.1° N of Antares
	6	Tue	13:44	Moon at Apogee: 405 100 km
	8	Thu	16:23	Saturn 4.2° S of Moon
	9	Fri	06:49	FQ rises locally 2:43 pm DST
	16	Fri	13:54	Penumbral Lunar Eclipse
			14:05	FM rises locally 7:05 pm DST on Sep 15
	18	Sun	10:15	Spica 2.4° N of Venus
			12:00	Moon at Perigee: 361 900 km
	21	Wed	17:13	Aldebaran 0.2° S of Moon (Close miss below local horizon)
	22	Thu	09:21	Autumnal Equinox
	23	Fri	04:56	LQ rises locally 11:47 pm DST Sep 22
	27	Tue	17:32	Regulus 1.8° N of Moon
	28	**Wed**		**Mars 1.5° S of Lagoon Nebula M8**
			13:59	**Mercury Greatest Elongation West: 17.9°**
	30	Fri	19:12	NM rises locally 6:50 am DST (2nd NM)

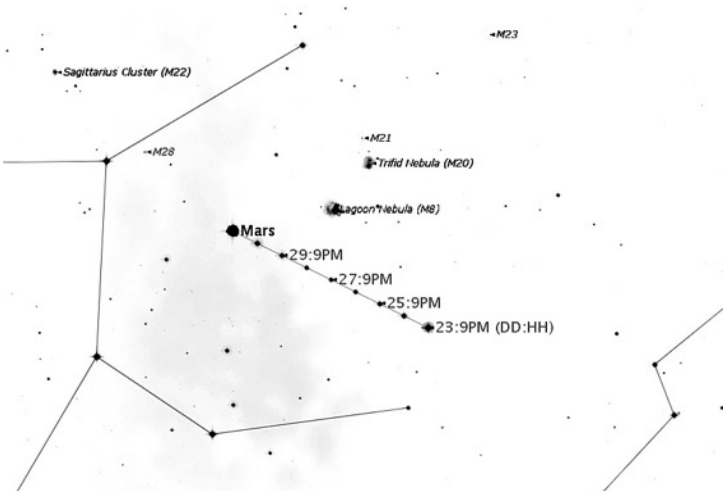
BAS Events

Sep	**1**	**Thu**	**NM**
	3	**Sat**	**Fox Dark of Moon viewing (BAS members and guests)**
	7	**Wed**	**Regular Meeting at Fox Obs**
			Topic: Beginner's Astrophoto Hints: Brett T.
	17	**Sat**	**5th Anniversary ES Fox Obs Celebration!**

Special Events

Mars Gets Steamed!

Mars continues tracking eastward across the sky in the early evening hours of the last month of summer. Look for it in the steam from the spout of Sagittarius' Teapot in the last week of September. On Sep 28 and 29, Mars is 1.5° from M8, the Lagoon Nebula and twice that away from M21, the Trifid Nebula. Photo Op!



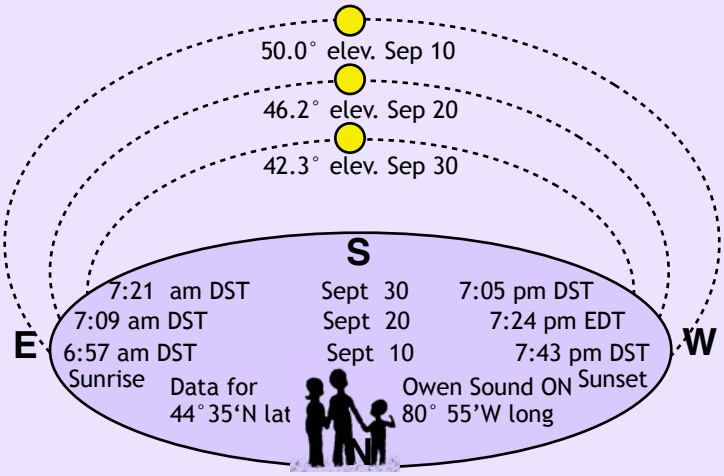
The path of Mars across Sag in the last week of September is shown above. Its location is given in two night intervals at 9 pm on dates from Sep 23 to Oct 1. Sunset is at 7:03 pm Oct 1 and Mars is 13° or so above the horizon. Lots of time to get a look (or an image) before Mars sets at 11 pm DST.

Planets

MERCURY, an evening planet now hugs the horizon after sunset making it difficult to see. It is too close to the Sun for viewing.

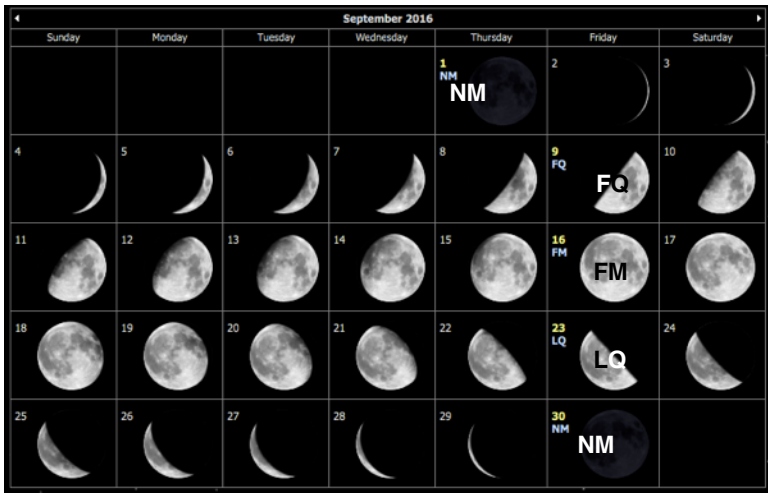
VENUS, (-3.9) stays low on the horizon in the west all month but can still be seen all month for a short time after sunset. **MARS,** is mag. +0.6 by month-end and continues to track eastward and into Sagittarius this month. It passes 1.5° below M8 Lagoon Nebula on Sep 28. **JUPITER**, (-1.7) after its close pass to Venus last month, draws closer to the Sun and is lost in its glare in mid September. **SATURN,** (mag. 0.5) is low in the west at dark and sets before 11 pm by month end. Saturn and Mars viewing is drawing to a close but Saturn is still worth the effort to observe even in twilight. **URANUS,** (5.8) and **NEPTUNE,** (7.9) are rising now before 9 pm and high on the meridian by midnight. Neptune is at opposition Sep 2 and Uranus opposition is Oct 15. **Dwarf planet**, **Ceres** (8.2) rises an hour after Uranus. **Asteroid, Vesta** (6.7) is in the club of Orion and rises by 4 am. **PLUTO** (mag. 14) is in Sagittarius and is in dark sky only until midnight or so. Charts for these planets/asteroids for 2016 are on the BAS website.

The diagram below gives the sunrise/sunset times and the Sun's altitude for September. The Sun crosses the equator heading south on Sep 22 and continues to lower its elevation in the sky. The moon phase graphic at the bottom of this page shows the lunar phase for each night of the month. Times of moonrise for NM, FQ, FM and LQ for Owen Sound are listed in the Sky Calendar at left.



Moon Phase Chart for Sept 2016

created with QuickPhase Pro 4.0



BAS Member Loaner Scopes

Solar H-alpha scope now available.

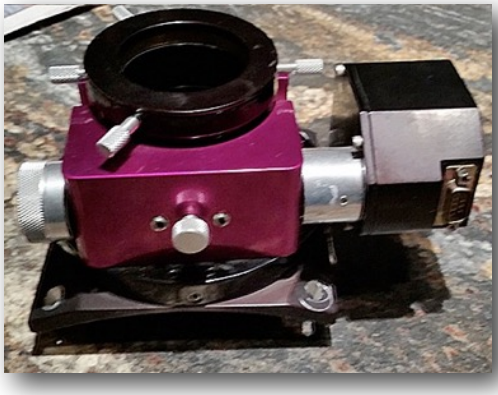
Our Lunt solar scope can be borrowed by BAS members and it is waiting at the Fox! Contact John to get your hands on it. We now have a suitable mount for it as well. A short training session will be provided on pickup.

Several Dobs available.

One 12-inch dobsonian loaner telescope is available for free loan to members. Smaller 8-inchers are also available. Contact John H. or Brett T. for availability. Scopes come in and out so keep checking with John or Brett if you are interested in a loaner.

SGN Classified Ads Section

(Now also on our website)



FOR SALE: Moonlite CRL 2.5 inch Large Format **Crayford Newtonian Focuser** ($592.10 new -see https://focuser.com/products.php) with Hi-Res Stepper Motor ($252.81 new). Flange for 14" tube, accepts 2" accessories (EP/camera). This is a **true Crayford focuser**, not the cheap "Crayford-style" knock-off. Not set up for manual focusing, requires hand paddle ($330 not included) for manual operation and computer control for remote focusing. This is meant for a remote imaging setup and comes from an abandoned project (12" scope). Over $850 plus taxes and shipping new.
Asking $600.00. Contact **Paul** at ski@bmts.com