



# OBSERVER

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Newsletter of the New Hampshire Astronomical Society

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## *Boats and Waves*



*Boats at Lake Paittasjärvi, Pirttivuopio, Sweden.*

*(Credit: Mia Stålnacke)*

*Northern Lights are dancing all over Kiruna in the Lapland of Sweden in this image from September 10, 2015. Mia Stålnacke received global acclaim for her "[Flag over Kiruna](#)" APOD image (published also in the [March 2015 Observer](#)) and her fabulous shots illustrate the featured article in this issue (see page 11).*



### *Seeing The World in a Grain of Sand*

*To see a World in a Grain of Sand  
And a Heaven in a Wild Flower,  
Hold Infinity in the palm of your hand  
And Eternity in an hour.*

from "*Auguries of Innocence*"  
by William Blake (1757-1827)

One of the things that the poet is saying is that the universe rhymes: similar things happen on different scales and you can learn about the large scale by looking carefully at the small scale.

I had such an experience recently. I was heating milk for cappuccino on a gas stove. As I looked down on the milk, I realized that the foaming of the milk was a model of the classic white-dwarf nova.

Here's how a nova works: gas, mostly hydrogen, from a companion star falls onto the surface of the dwarf. As it accumulates, it gets hotter and hotter and the lower parts are under more pressure. Eventually some part of the new gas is hot and pressured enough to start fusing. The fusion creates heat which causes more of the gas to fuse and this leads to ignition of the whole gas shell. That produces the visible nova.

My milk is being supplied with heat rather than hydrogen. Think of the surface of the milk as a cross-section of a white dwarf. The heat is supplied at the bottom of the pan but because it is a gas stove, the sides of the pan are also hot. Where the surface of the milk meets the pan, the milk gets hotter faster. Eventually, one tiny segment of the edge boils and foams. The foam expands upwards and thus comes in touch with the hot side of the pan. This adds new energy to the milk and is thus analogous to the energy release of fusion. The boiling spreads around the rim and then the whole surface lifts off and, if you don't catch it, it overflows onto the burner. That's the nova.

Of course there are significant differences, but I was pleased to make the connection. The large is connected to the small and we are part of what we see when we look up at night. For me, that connection is a rewarding part of being an astronomer.

**John Bishop**  
NHAS President

## *Sky Watch Review*

*Goffstown High School,  
Goffstown NH, October 6*

Some 20-30 students attended this month's session. NHAS members participating were **Herb Bubert, Gardner Gerry, Steve Rand, Bob Veilleux** and **Paul Winalski**.

- **Paul Winalski**

*Hooksett Public Library,  
Hooksett NH, October 7*

The event was attended by about 35 people. After a short 25-minute presentation by me, **Gardner Gerry, Paul Winalski** and I showed library patrons views of Saturn, the Messier objects M13, M27, M57, M11, M20, M31 and M92, as well as some double stars, a few carbon stars and the Perseus Double Cluster.

- **Bob Veilleux**

*New Hampshire Boy Scouts  
Jamboree, Loudon NH, October 10*

**Steve Forbes, Bob Veilleux** and **Paul Winalski** from NHAS participated in this skywatch event. Skies were steady but there was a lot of haze. The turnout was a bit disappointing; the live music concert that was supposed to conclude at 8pm ran on much later, and that seems to be where everyone was.

We set up in one of the New Hampshire Motor Speedway's huge parking lots.

This lot was on high ground and had superb horizon views, but unfortunately it was also in view of the bright floodlights near the Speedway itself. Next time we will know to stay away from those lights. NHMS has the potential to be an excellent observing site, if one can avoid the floodlights.

I showed 61 Cygni, T Lyrae, V Aquilae, NGC 457, the Perseus Double Cluster, the Pleiades, M11, M13, M27, M57, and M31/M32. Steve got some excellent views of Uranus, Neptune, and of Pluto!

- *Paul Winalski*

### *Robert J. Lister Academy, Portsmouth NH, October 15*

The event took place under near perfect skies. About 15 students got to see the Sun in both white light (through a TeleVue 85mm refractor) and H-alpha (through a Coronado 40mm Personal Solar Telescope).

- *Paul Winalski*

### *Merrimack Parks and Recreation, Merrimack NH, October 15*

The skywatch at Wasserman Park attracted about ten people. I did the presentation in the rec hall while **John Bishop** set up the only scope in the area adjacent to the sports field. Though encumbered by the nightlights and ongoing football practice sessions, John was still able to pull in M31, M13, M57, the Double Cluster, Albireo and more.

It was not a bad venue, except for the lights.

- *Steve Rand*



*John Bishop and Steve Rand flank the scope as Merrimack residents line up at Wasserman Park to take in the views of the night sky. (Photo: Steve Rand)*

### *Samuel Douglass Academy, Brookline NH, October 16*

Over 150 attended the event, mostly 5th graders with their adult supervisors. **Gardner Gerry, Steve Rand, John Rose, Mike Townsend** and I were there representing NHAS.

I had done an indoor presentation for the kids on Wednesday (2 days ago) and they were psyched, wanting to see (among other things) the Double Cluster, M13 and NGC457.

The forecast was for partly cloudy skies, but it went well. The school was unable to turn off the lights in the parking lot in front of their building, so we were invited to set up our scopes in the soccer fields behind the building.

They are talking about doing another skywatch in the winter at 1st Quarter Moon and they're even going to have a bonfire and roast marsh-mellows for us!

- *Ed Ting*

### *Auburn Public School, Auburn NH, October 23*

We had clear skies and a big crowd of 7th graders busily filling in their worksheets with their observing reports. NHAS was represented by **John Pappas, Bob Veilleux** and **Paul Winalski**. The lines were a bit long but manageable.

I started with the Moon, then, as it got darker, Albireo and Mizar, and then NGC 457, M13, M31/M32, and finally T Lyrae.

- *Paul Winalski*

### *Concord High School Solar Observing, Concord NH, October 27 and 30*

There were 2 events, the first was for the Tuesday/Thursday Physics class of about 30, the other for the similarly sized Monday/Wednesday/Friday Physics class. Both sessions took place on their respective backup dates.

At the first event, the students got to see a couple of sunspot groups in white light and got an excellent view of a huge prominence through the school's 60mm Lunt H-alpha scope. I was hoping that if we could find Venus I could get a view of both it and Jupiter in the TV-85, but there was too much background haze to do the Venus-in-broad-daylight trick.

The second event went along similar lines: at first it looked as though we would have overcast skies again, but it did clear up and the students got to see a large sunspot group and a huge, bright prominence.

- *Paul Winalski*



## YFOS Orientation, October 10

It was crisp Fall Saturday evening at YFOS, and with a date of 10/10 it was the pick of recent days to hold a New Member Orientation session. Arranged by **Pat Adams** of the Membership Committee (who unfortunately couldn't make it in the end), it turned out to be an evening to remember.

A few old-timers like **John Shonle** and **Bob Veilleux** showed up for a refresher course. **Larry Lopez** conducted the drill on how to fetch the keys, turn on the mains power, operate the Observatory roll-off roof, deal with the 16" dob and

most importantly, on how to warm up the Warming Hut. Then **Gardner Gerry** introduced the attendees to the Observatory's Losmandy Titan mount and demonstrated its proper use. Even **Dr. Jim Young**, the man whose last name provides the first letter in 'YFOS' and who's the only lifetime member of NHAS, joined the group for a while.

Among the new and not so new members 'oriented' were: **Jeremy Burton, Nancy and Dick Byrd, John Desbiens, Dennis Isbell, Todd Nelson, Jane and Doug Novielli, Steve Panish, Denise and Mike Rosander, Curtiss Rude, Glenn Tonneson, Mike Vaccaro** and **K. K. Varghese**.



*Larry Lopez with his beard and Jim Young with his coffee mug (left), and Gardner Gerry with the mount (center). The other members, from left and regardless of rows: Glenn Tonneson, Mike Rosander and Denise Rosander (obscured), Jeremy Burton, Mike Vaccaro, Curt Rude, Steve Panish, Todd Nelson, Doug Novielli, Dennis Isbell and John Desbiens. (Photo: Bob Veilleux)*



*"Address the ball!" – Gardner and Steve Panish contemplate the Titan mount, as John Desbiens ponders sitting down.*



*Todd Nelson and Dennis Isbell have similar notions from the other side. (All Photos: Denise Rosander)*



*The C14 atop the Titan manages to cut Todd down to size, as Jeremy Burton looks on. Being out in front helps!*

The evening was successful enough for Larry to start thinking about a pot-luck for the November event. He has cleared the matter with Jim Young regarding usage policies of the site (which has been leased to the club) and Dr. Young will be joining members for the Coffee House Night pot-luck next month. But as to why it is called "Coffee House Night," no one really remembers.

As they become more familiar with the site, the new folks will be having the other, real orientation: how not to leave a window ajar in the Warming Hut, how to grin and bear when yelled at in the dark for opening the car door (an act that switches on the dome light inside), how to back out of the parking space when leaving early (without the car-lights bothering the astro-imagers at work on site), that sort of thing. But it is all in good fun and comradeship.

### **Comments and feedback from some of the new members:**

*Although the drive up took me a little under an hour, it was not a drag because the scenery at this time of year is pleasant on the eyes. I got to YFOS early and someone pulled in in a Lincoln town car (I think) and an EPIC BEARD which I can only aspire to! Wherever Larry goes, his beard gets there first.*

*Larry and the crew were friendly, welcoming and happily answered questions. The facilities are great and I'm looking forward to the November Coffee House. Here's to clear skies!*

- **Jeremy Burton**

My husband Dick and I were there. Your setup is quite similar to the observatory I helped to build and was a part of on Bull Run Mountain in Virginia. I was delighted to make the trip, but you are a bit too far from Tufonboro for us to be more than occasional visitors. Thanks for the demos and the hospitality.

- **Nancy Byrd**

*I enjoyed getting a look at the facility and was very entertained by Larry Lopez. I'm a new member and a total neophyte so I doubt that I'll be utilizing YFOS unless it's for an organized event -- at least not in the near future. The club is lucky to have such a great facility.*

- **Glenn Tonnesen**

Beautiful location and a great viewing site; my thanks to all for the presentations. A bit of maintenance is in order for the drive as was noted, but it is impressive how the 14" Celestron has been rigged to easily mate with the mount. I still won't try it alone but with one other person I'd have no fear. This site shows a lot of commitment on the part of club members.

It was a long drive for me and I have a good site, so I'll only be there when I want to specifically view with the big scopes or be sociable, or learn about a specific topic (imaging please!). The roll-off roof is very impressive and functional. However the easy access by critters is distressing with such nice gear essentially going unprotected. I'd suggest building some simple cabinets for storing all the gear, and yes, I can help with that. It might be difficult with the 14", but even a tarp or cover would help.

- **Steve Panish**

*The site is amazing. I was most impressed with the dark sky and the generosity of the club members who assisted in the orientation. I'm looking forward to bringing my scope as I try reacquainting myself with amateur astronomy. Thanks to the veteran club members who made this a success. A big thanks as well to the property owner - what a gesture of generosity!*

- **Mike Vaccaro**



*Gardner dealing with the 8" Meade LX90 SCG, as Mike Vaccaro, Glenn Tonnesen and Larry Lopez look on. (Photo: Bob Veilleux)*



*Jeremy Burton watches Gardner's steps with Doug and Jane Novielli, while Mike Rosander's sweatshirt tries to blend with the foliage. (Photo: Denise Rosander)*



It is a great site, though I think I'll be using my Orion XT8 more than the observatory -- I am a visual observer who hand slews. I will definitely use the site as my house is surrounded by trees, but I guess that gets me out of hosting Messier Marathons. Thank you for the tour!

- **Todd Nelson**

*My husband Mike and I have just renewed our membership. It was our first trip to YFOS and we loved it.*

- **Denise Rosander**

***We also heard from old-timers:***

It had been several years since I was there. I was amazed by the turnout of over 15 members. It was a very worthwhile event; the club should have more of these. Larry and Gardner were terrific.

- **Bob Veilleux**

*It has been a while since my last visit, so I showed up for a refresher. Then I set up a new Celestron CPC 8 inch. I am still learning how to get the best alignment. One problem was that the sky was dark enough that I could not see the cross hairs in my spotting scope, so doing the first stage of aligning on a star was difficult. I got some good viewing on some objects, but then went GOTO-free looking at various parts of the Milky Way with my new Televue Nagler 31 mm. Wow!*

- **John Shonle**

The Titan workshop was not entirely successful. The battery in the Gemini was dead and has to be replaced. The mount acted funny, so I shut it down. I did demonstrate how to install and remove the 8" and 14". We should have a Titan Workshop Part 2 after I get the mount back up to snuff.

- **Gardner Gerry**



*Getting ready for Astronomy in the midst of Fall foliage: only in NH. (Photo: Denise Rosander)*

***Larry Lopez had the last word:***

*Today we had the walkthrough for YFOS and the mount in the Observatory. The response to this was phenomenal. People wanted to do it again. It was suggested to me that we should have a pot-luck next time. So, let's do that. I think we also need a project.*

A project? Yes, you read that right.

In the immortal words of **Steve Forbes**: *Y'all been warned!*

- **Ramaswamy**



*Jane and Doug Novielli, K.K. Varghese and Curt Rude looking around the grounds. (Photo: John Desbiens)*

### ***The Rey Center, Waterville Valley NH, October 10***

It was a very busy night at the Rey Center for the resident astronomer. A perfect storm of attendance – Columbus Day weekend, fall foliage tours and ideal weather – meant that the place was packed. I stayed busy from 7pm through 9:30pm showing the night sky through the XT8 and even started to lose my voice towards the end. And just as the event officially ended at 9pm, several cars pulled up and 17 more people spilled out!



*The XT8 at dusk. The parking lot would be full less than 10 minutes later.*

*(All Photos: Ed Ting)*

- ***Ed Ting***



*The Fall splendor before darkness falls.*



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### ***The Ghost Hunt, New Boston NH, October 17***

This event was scheduled to be held at the **Wicketts** in Lyndeborough NH on Friday October 16, but after mowing all the fields for the event, disaster struck!!! They discovered that they both had to work on Saturday.

I broached the subject with Linda and with no hesitation Linda said "sure" and that I should leave. I was happy about this, and not wanting to spoil the moment I beat a hasty retreat on Friday. I had previously arranged to go to NEAR-Fest on Friday and Saturday to look at all sorts of Amateur Radio Gear.

On Saturday she again told me to leave, so I beat a hasty retreat a second time. I prognosticated that Saturday was going to be the better day. This turned out not to be true.

**Steve Forbes** discovered this at the Sidewalk Astronomy skywatch at Market Square in Portsmouth. As sole NHAS representative he made an executive decision to come to the Ghost Hunt. After all it was raining and no one was there for observing. Still, he satisfied the NHAS requirement to actually observe the rain.

The weather actually toyed with us and eventually cleared much later than expected. The intrepid duo of **Rich DeMidio** and **Joe Derek** observed until about 2am (I was watching *Dark Knight* the other night and I'm not sure which one would be Batman and which one would be Robin).

In attendance (with pot-luck):

Linda Lopez (chicken stew).	David "Rags" Gilmore (Nori treats).
Boo Trey (a mighty appetite)	Stu May (desert)
Sue McPhee (cheese and homemade pumpkin bread)	Steve Forbes (pork chili)
Richard Marshall (cheese and homemade pumpkin bread)	Quinten Forbes (another mighty appetite).
Ken Charles (chicken wings)	Rich DeMidio (beef jerky!!!)
John Rose (pink lemonade)	Joe Derek (meat balls)
Mike Townsend (beans, hot dogs and an onion).	Larry Lopez (A Truly Mighty Appetite)

The pork chili Steve brought was perfect. Rich's beef jerky was addictive. Ed Ting really liked Linda's chicken stew.

I would like to thank everyone that attended. Did I leave anyone out? If so, sorry.

- **Larry Lopez**

### *LTP in the News*

*"Today, the sky is no limit in our mission at the public library to enrich the lives of our patrons. Literally. In September, a jolly bearded man came into the library proudly carrying the donated Orion StarBlast 4.5" Telescope in his arms. Our jovial benefactor was Marc Stowbridge, who had contacted the Library earlier in the summer from New Hampshire to tell us about his astronomical society that has donated over 100 telescopes to public libraries to help fulfill libraries' educational missions."*

Thus begins the story entitled [\*"Reaching for the Stars"\*](#) in the Fall 2015 Friends of the Library Newsletter of the **Port Townsend Library** in Port Townsend WA, written by **Melody Sky Eisler**, the Library Director. **Marc and Sue Stowbridge** travelled to Seattle last month to visit their long-time friends in Port Townsend: **Rob and Martha Jane Peck**. From there it was but a small step to the local library to hand off a custom-modified Orion StarBlast 4.5. The Library itself was established in 1898 and in 1913 it received a grant from industrialist Andrew Carnegie that funded acquisition of its present building; it is celebrating its 102nd anniversary this month. The article continues: *Marc demonstrated the ways he had modified the telescope to make it easier to use, even creating a simplified user guide that includes information on how to host a "Star Party," a program that the library looks forward to hosting soon.*

We look forward to a skywatch report. With a current lull in LTP activity within the State of New Hampshire, Marc Stowbridge decided to reach out to the west coast to donate a scope. The man likes to keep busy. Well done, Marc!

***The best testimonial to the impact of the LTP recently is this October 10 email from a new member:***

*I'd like to thank you all for the NHAS Library Telescope Program. It is a great program not only for young people but also for a middle-aged guy like me. This summer I started thinking that I might enjoy backyard astronomy, but wasn't entirely sure. I found out about the NHAS library scope program (through your website), took out the scope from our local library here in Portsmouth a couple of times, and got hooked. I subsequently bought my own scope (an 8" Dob). Your library program helped get me started on a wonderful hobby that I now hope to pursue for the rest of my life, and so, I thank you for that. I joined NHAS this past week.*

**Dave Schleicher**  
Portsmouth, NH



**Marc with Sue, MJ and Rob behind him, flanked by Kit Ward-Crixell and Melody Sky Eisler. (Photo: Melody Sky Eisler)**



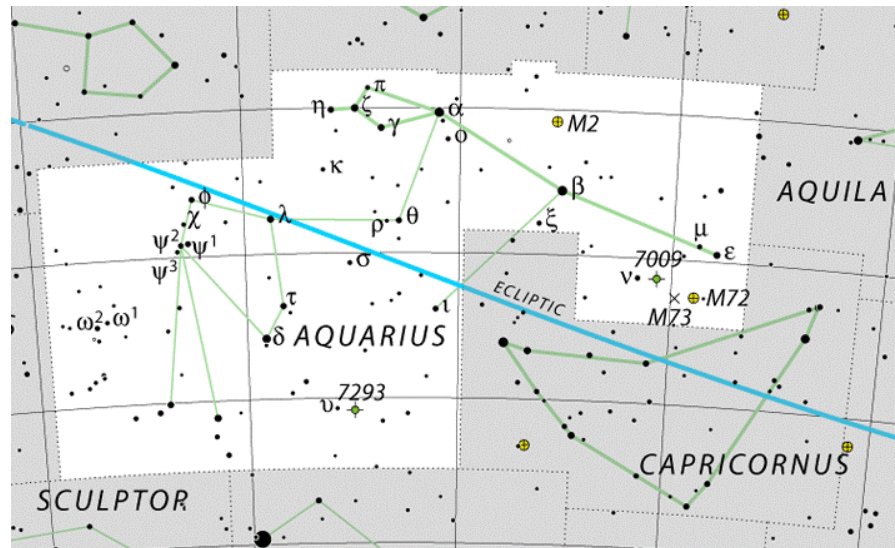
## NGC 7009 (Saturn Nebula) – Planetary Nebula in Aquarius

by Glenn Chaple

An entry in my astronomy logbook dated October 6, 1977 reads: “I finally notched a real stinker!” No, it wasn’t one of the skunks that occasionally stroll across my back yard while I’m outside observing. My notes continue, “After numerous attempts to see the planetary nebula NGC 7009 (Saturn Nebula), I tried tonight using 60X. To my surprise, a relatively bright, bluish star would not focus clearly. When I obtained clear focus on a nearby star of similar magnitude, I returned to the mystery object. It was still “out of focus!” The elusive nebula had passed as a “star” all the time! I had to chuckle. Hopefully, I will be more careful in searches for other planetaries.”

I was. In rapid order, my trusty 3-inch f/10 reflector and I picked off the planetaries NGC 7662 (the Blue Snowball) in Andromeda and NGC 6826 (the Blinking Planetary) in Cygnus.

NGC 7009 was discovered by William Herschel in 1782. When William Parsons, the third Earl of Rosse, viewed it in the 1840s with his 72-inch reflector, the Leviathan of Parsonstown, he noticed fine lines, or ansae, stretching out to the sides. The visual similarity to the planet Saturn led Parsons to give the nebula its present-day nickname.

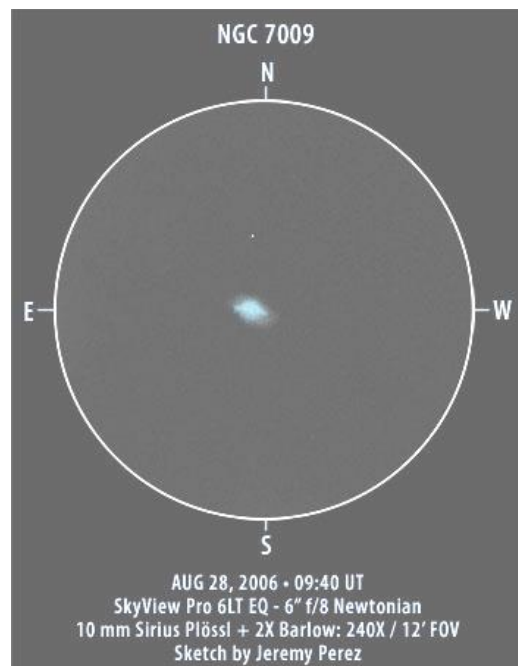


(Courtesy: [www.constellation-guide.com](http://www.constellation-guide.com))

The Saturn Nebula shines at magnitude 8.3 and sports angular dimensions of 45" by 25" - slightly larger than its namesake planet. Estimates of its distance are all over the map, ranging from as little as 1400 light years to as much as 5200 light years.

The best way to find the Saturn Nebula is to point your telescope at the 4.5 magnitude star nu (ν) Aquarii. Using a magnification of 50-75X, move a little over a degree west until a bluish star appears in the field. Then, jack up the magnification as high as your telescope and seeing conditions allow. Under ideal skies, telescopes as small as 6-inches might capture the ansae and 12<sup>th</sup> magnitude central star. Much larger apertures will be a must when the Saturn Nebula is observed from typical suburban locations.

Recently, I revisited the Saturn Nebula, this time with a 10-inch f/5 reflector and magnifying power of 208X. It was definitely elongated, but I was unable to see the ansae or central star (the limiting magnitude that night was 5.0). By chance, someone nearby was viewing the planet Uranus. I jumped at the chance to make a color comparison. Like the Saturn Nebula, it sported a pale blue color. On occasions when its ansae aren't visible, we could aptly refer to NGC 7009 as the “Uranus Nebula.”



(Courtesy: [www.perezmedia.net](http://www.perezmedia.net))

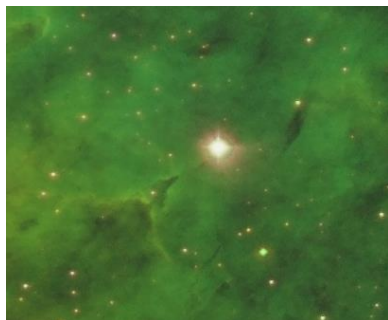
### Sharpless Region Sh2-171



*The Sh2-171 star-forming region in Cepheus (rendered in the Hubble Palette)*

*(Credit: Herb Bubert)*

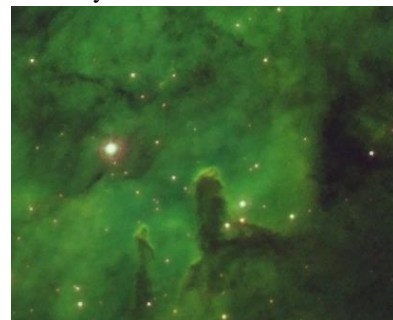
This region is part of **NGC 7822**, a star-forming complex some 2600 to 3000 light years away in the constellation of Cepheus that also contains a cluster of stars called **Berkeley 59**. As this image only includes a portion of **Sh2-171**, technically it should be called **Cederblad 214**. These catalog names aside, Sh2-171 contains a young open cluster that all of the Pillars (also called Elephant Trunks) are pointing towards, as well as another large, arc-shaped nebula that is not in the frame. Stars in the cluster are thought to be no more than a few million years old and are some of



*“Lumos!” O-type stars emit UV radiation that ionizes the surrounding cloud of H<sub>2</sub> gas, forming H II regions. Uneven ionization creates denser clumps called EGGs.*

the hottest stars found this close to us. A star therein, designated BD+66 1673, is classified as an O5V type with an estimated surface temperature of about 45,000K and luminosity  $10^5$  times that of our own Sun. But given the rate at which it is consuming its fuel, it won't last very long!

*[The image above was taken with an NP127 on the G11, using an SBIG ST-8300m CCD camera, with over 13 hours of exposure using Ha, OIII and SII filters (10 minute subs).]*



*“Pillars of Creation” was coined for the [Eagle Nebula](#), but Pillars exist all over. They rotate along their major axes, almost like rigid bodies, and some are stretching.*



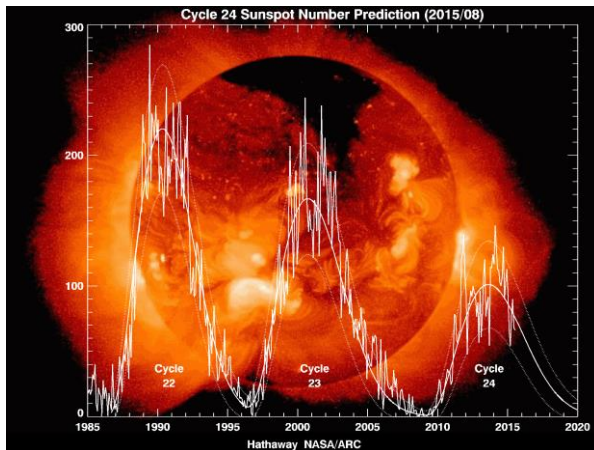
## Aurora, Surprise Aurora

For NHAS members, the drill begins with an alert issued to the Chat mailing list by **John Blackwell**, indicating the level of intensity of a geomagnetic storm brewing and the current and expected Kp levels – it usually ends with the advice to look north. Lately **Ted Blank** has been issuing the odd alert from his Arizona base. They amount to the NHAS equivalent of **CBAT** notifications, except **CBETs** are about confirmed sightings of objects, while these are about the hope of sighting something. And as often as not, the NHAS alerts are the harbinger of cloudy conditions!



*Matt Marulla imaged the displays of the Solstice Storm on June 22 from Pack Manodnack, while Pat Bourque set up atop Stratham Hill on October 7 to capture the aftermath of a geomagnetic storm caused by a co-rotating interaction region (CIR).*

The lucky few NHAS members that manage to see any colors report and/or image them. **Matt Marulla** heads up to his favorite pad atop Pack Manodnack whenever possible (though his serious work is done from near Dummer NH, close to the Canadian border), while **Pat Bourque** uses his lookout spots on the Kancamagus Highway. Located as we are between 43°N and 45°N, a display of Aurora Borealis in New Hampshire invariably happens to the north. Near the Arctic Circle, whether in Alaska, Canada or in Scandinavia, the displays can occur in any (azimuthal) direction. The Big Dipper that is a staple of most Aurora images taken in New Hampshire is not always in the picture there; indeed the starry background could be anything at all, and well worth noting along with the bands.



*Smoothed sunspot number prediction for Solar Cycle 24. (Courtesy: Dr. David Hathaway, ARC/MSFC/NASA)*

We are now past the mid-point of Solar Cycle 24 of sunspot activity. These cycles are measured from trough to trough and run 9 to 14 years, 11 years on average. The current cycle began in January 2008 and peaked in April 2014. If projections are to be believed, the next trough is beyond 2020, making this a longer than average cycle, even though it had the lowest peak in more than a century.

Sunspots, or more correctly Active Regions, occur where magnetic fields on the Sun are more intense than average. As these regions grow and change shapes, the ever-shifting magnetic fields above the spots can lead to a condition known as magnetic reconnection, the coming together of two oppositely aligned magnetic fields. This results in the explosive release of the enormous energy stored in the stressed fields, generating bursts of radiation right across the EM spectrum – from the short wavelength gamma-rays and X-rays to the long radio waves. These Solar Flares are classified into 5 categories according to the intensity of the X-rays they produce in 1 to 8 Ångström unit wavelength range, as measured by a NOAA GOES satellite: ‘X’ flares are the big ones, ‘M’ flares are medium-sized and ‘C’ are the small ones, whereas the ‘B’ and ‘A’ flares barely register. Each category has nine sub-categories from 1 to 9; thus an X1 flare is more intense than an M9. And as we shall see, ‘X’ sub-categories are numerically open-ended.



A solar flare can send a Coronal Mass Ejection (CME) of billions of tons of solar plasma (electrons, protons and other ions) hurtling into space at more than a million miles an hour. Earth-directed CMEs can reach us in 2 to 4 days and cause the geomagnetic storms leading to aurora display. The more energetic CMEs can cause radio blackouts.

But it is not always so straight-forward; there is an element of surprise that auroras seem to keep up their proverbial sleeves. For reasons that no one really understands yet, they seem to love equinoxes, which is why most aurora viewing tours take place in March and September. But in the year 2015, somewhat past the Solar Cycle maximum, we in the northern hemisphere have witnessed fantastic aurora displays at the summer solstice, at a time when there was practically no sunspot activity, and also when a CME missed the Earth and aurora displays happened anyway!

### *The Summer Solstice Surprise*

As already reported in the [June Observer](#) (page 12), this was a straight-forward example of an Active Region being responsible for all the fireworks, except for the timing of it all. AR2371 swung into view on June 17 and unleashed the biggest solar flare in 2 months the very next day – an M3-class explosion whose CME delivered a glancing blow to Earth's magnetic field. A succession of CMEs followed and on June 21, *SOHO* caught view of a Full Halo CME. A severe and long-lasting G-4 class geomagnetic storm began on June 22; it was dubbed the *Solstice Storm of 2015*. On June 22, aurora was visible as far south as Georgia and Arkansas. AR2371 generated CMEs on a daily basis from June 21 until it swung out of view on June 27. Things got very quiet again after that.

### *The September Phenomenon*

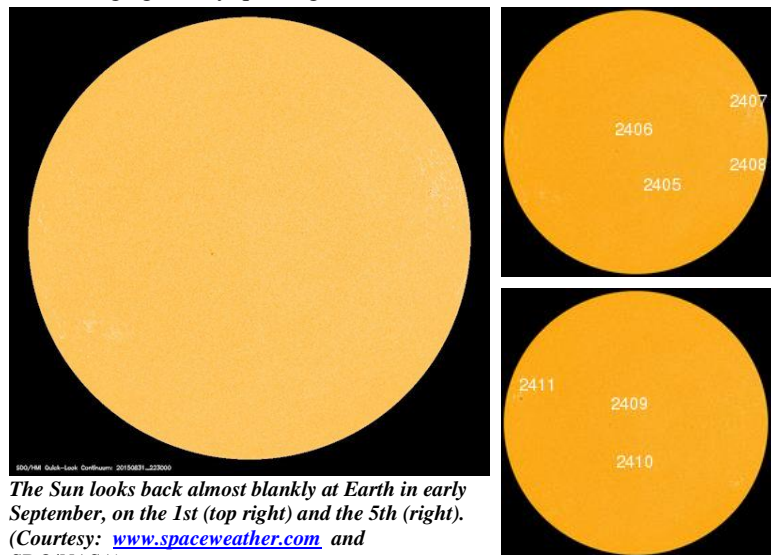
September began in ultra-quiet fashion. The Sun's disc was free of any significant Active Region; none present on the Earth-facing side had stressed magnetic fields capable of generating strong flares and the Sun's X-ray output was negligible.

The only matter of interest that week was the 156th anniversary of the *Carrington Event*. On September 1-2, 1859 a massive CME slammed into the Earth's magnetosphere, resulting in Aurora Borealis visible in Cuba and Aurora Australis in Tahiti. The one major electrically powered infrastructure of the day, the Telegraph, was knocked out of service around the world,

along with some unlucky telegraph operators. A similarly intense direct hit today would cause gigantic dislocations in the power grids that might take up to a decade to repair or replace. There have been a number of major incidents recently recorded of CMEs that were, fortunately, not Earth-directed: on April 2, 2001 (an X-20 class), November 4, 2003 (initially classified as X-28 class, later upgraded to X-45, it marked the end of the [Halloween Storms](#) that raged from October 28 on) and July 23, 2012 (an X-class that rivalled the Carrington Event, it did hit *STEREO-A* in orbit but that survived); the X-class sub-category had to be numerically extended to properly classify such huge flares.

Then on September 5, a filament burst in the Sun's southern hemisphere. A filament is just a solar prominence that is facing the Earth and not projecting off the limb. The *Solar Dynamics Observatory* spacecraft observed a large CME emanating from the site, but the trajectory was determined to be not Earth-directed; at best it would deliver a glancing blow on September 7. Cometh the day, cometh the show. The CME missed, but a G-2 level geomagnetic storm broke out anyway as the Earth passed through a stream of solar wind.

With the odds of a strong solar flare computed to be no more than 1%, for 5 days a stream of solar wind buffeting the Earth's magnetic field caused bright auroras all over northern North America and Europe. Red aurora was seen in Virginia; these occur very high in the atmosphere, about 200-300 miles up, much higher than the green aurora.



*The Sun looks back almost blankly at Earth in early September, on the 1st (top right) and the 5th (right). (Courtesy: [www.spaceweather.com](http://www.spaceweather.com) and SDO/NASA)*

They are believed to be caused by low energy electrons moving too slowly to penetrate deeply into the atmosphere. When such electrons recombine with oxygen ions in the upper atmosphere, red photons are emitted. The question on everyone's mind was the same: *How could such a display occur while solar activity was so low?*

The answer, it turns out, had to do with the [interplanetary magnetic field \(IMF\)](#). On September 7, the IMF tilted south, [opening a crack in Earth's magnetosphere](#), which can form high above the Earth and remain open for hours. Solar wind (which exists even during times of quiet solar activity) poured in unchecked and sparked off the auroras. But we were still protected by our atmosphere from the harmful radiation, even if the magnetosphere let us down.

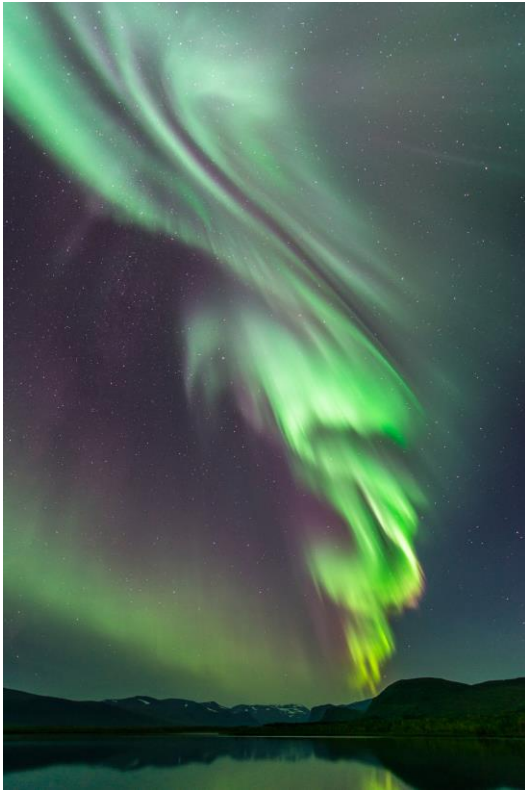
### *In the Skies above Kiruna*

**Mia Stålnacke** is [an avid aurora photographer](#), based in **Kiruna, Sweden**. The image of a St. Patrick's Day display over her hometown was [APOD of March 30, 2015](#) – the iconic “Flag over Kiruna.” Her [guide to Aurora Imaging](#) is impressive with its “keep things simple” approach – note the tip for dealing with camera shake when the shutter is being manually operated! Mia was at nearby **Pirttivuopio** the night of September 10 and one of her images taken that night is shown here. It is the first of five shots between 11:19pm and 11:25pm CEDT (UT+2) being featured in this issue of the **Observer** (the last of the sequence, taken at 11:25pm, is the Page 1 image). Most of the later shots were of 8 seconds of exposure, but the one below was a 20-second exposure at ISO 800 on her Nikon D800 with a wide-angle lens at f/2.8 and 14mm focal-length. Somehow it is fitting that the “searchlights” are more or less from the east.



*Searchlights over Kiruna: The circus hasn't come to town, but a geomagnetic storm certainly has. (Credit: Mia Stålnacke)*

*Right above the tree-lines is Pleiades (M45) rising, with Aries about a third of the way up the left searchlight beam, but the real jackpot is straight up – the main star in top-center is Mirach and one can make out the square of Pegasus between the two beams of light. Star-hopping vertically from Mirach leads to us to M31, a distinct smudge near top-center. Aquarius occupies the lower-right edge, with tau and delta Aquarii the pair of bright stars just above the horizon – the chevron trio of psi Aquarii to their left and just below the lower beam is tell-tale (see page 9). Perseus curves up from M45; Capella is near the left edge.*



*A sequence of 3 exposures taken in just one minute, with the middle image being repeated for effect.*



*Taken over Lake Paittasjärvi near Kiruna, Sweden. 10 Sept. 11:22-11:23pm CEDT. One of those nights.*



As much fun as Mia was having in northern Sweden, others along the arctic circle were reveling too in the incredible bursts of aurora bands that Thursday. In [Fairbanks, Alaska](#), guests of tour guide **Marketa Murray** were practically weeping for joy. Similar feelings were being expressed from [Tromsø, Norway](#), as veteran aurora photographer **Ole Salomonsen** remarked: "it was not only the best display of the season so far, but maybe one of the best I have ever witnessed." This, after there had been no strong flare on the Sun for more than a month. That quiet continued.

### *The October Surprise*

It quadrupled in size in 48 hours but did not hog attention in the lead up to the Total Lunar Eclipse of September 27. But by the very next day the huge Active Region AR2422 facing Earth had developed an unstable 'beta-gamma-delta' magnetic field with enough energy to generate M-class solar flares, and it did just that. There were 6 M-class flares in the next 24 hours, concluding with an M7 flare that caused radio blackouts in the southern hemisphere on Earth. But there was one major difference. All the flares were of very short duration – there were no CME events because they can be generated only by longer duration solar flares.

On September 30, a massive load of plasma was ejected from the Sun's western limb, forming the core of a CME that was expected to give the Earth a glancing blow 3 days later. It was assumed to have missed Earth when not detected even by October 4. But auroras showed up anyway, with flashes of green and purple. Once again the question became: *If CMEs didn't cause these, what did?* As was the case a month ago, the IMF had tipped south, a crack had opened up in the magnetosphere, and solar wind just streamed in. Three days later it happened again (on October 7), but the IMF was not the culprit.

This time a Co-rotating Interaction Region (CIR) hit Earth's magnetic field. These are boundary zones between slow- and fast-moving solar wind streams. Solar wind plasma piles up in these regions, producing shock waves that spark auroras. A solar wind stream arriving in the wake of the CIR kept the storm going over the next three days and extremely bright aurora dominated the night skies – people could read their newspapers by aurora light. **Ole Salomonsen** of Tromsø had problems managing his exposure timings because of the intense bands, but he still produced [an extraordinary shot of the mass of green and pink](#) over his hometown.

To aurora watchers, old and young alike, it was a week to remember. Indeed it had been an autumn to remember.

### *Proton Arcs in August*

**Paul Zizka** is a [professional landscape photographer](#) who specializes in intriguing selfies. On August 16 he took one on the shores of Lake Minnewanka in Banff National Park, Alberta, but a selfie with a difference; he was looking at a rare Proton Arc that stayed stationary for about half an hour.

As the name implies, Proton Arcs are generated by protons and heavier ions raining down during a geomagnetic storm, leading to electromagnetic ion cyclotron waves – the ions travel parallel to the magnetic lines. The result is a sustained tight arc of light, sometimes even white, and not at all wavy curtains of the sort produced by electrons streaming down. By a strange coincidence, the detection from outer space of a 9-hour Proton Arc event helped prove that [cracks in Earth's magnetic shield are capable of lasting hours on end](#).

To some attendees at the Table Mountain Star Party that night, [their first ever sighting of aurora was a Proton Arc!](#)



*A selfie with a Proton Arc.* (Credit: Paul Zizka)



*Unfamiliar Blue to the west on St. Patrick's Day, but also a familiar star cluster.*

*(Credit: Mia Stålnacke)*

*Just to the right of the blue bands, between the clouds, lie the Seven Sisters. The Pleiades (M45) pair up with Aldebaran and the V of the Hyades in the middle to define the Taurus region. Above them is the pentagon of Auriga, with Capella hard to miss and Alnath below just to the left of the blue. Arcing from M45 toward the top-tight corner is the spine of Perseus and the starry region near Mirphak. Beyond that is the Double Cluster on the way to the corner and part of Cassiopeia. Back in the center, to the left of Aldebaran is bright Betelgeuse (Bellatrix is alongside), with the 3 stars of the Sword of Orion visible just above the tree-tops. The box of Gemini stretches diagonally to top-left, with gamma Geminorum and Pollux in a straight line and Castor to the right of its twin. The bright star above the left tree-top and a cloud is Procyon, and diagonally up from that cloud is the Beehive (M44). And believe it or not, beyond M44 but a bit below diagonally, a 'star' at the very edge of the frame is Jupiter. It is also likely that at the far bottom right edge of the frame, the fuzzy object a bit above the tree-tops is Venus.*

### ***A Postscript: Blue Aurora***

**Mia Stålnacke** shot the above 8-second image of what turned out to be Blue Aurora at 8:40pm on March 17, some 13 minutes before her “*Flag over Kiruna.*” The Sun had set more than an hour ago, but in March the Ecliptic over this land is a low arc well within 25° of the horizon – the twilight lingers. The bands were showing up blue on the screen of the Nikon D800, so Mia fiddled with camera settings to get her color ‘problem’ sorted. But the seeming unfamiliarity had a reason: it was first time she had seen Blue Aurora, which to the naked eye looked white. Once realization sunk in, she was ecstatic, of course! The human eye is adapted to green and has trouble seeing the true depth of Red Aurora as well – camera images of red aurora are usually more distinctive than the naked-eye view.

### ***Acknowledgements***

The images of **Mia Stålnacke** and **Paul Zizka** were the impetus for this article and the autumn surprises sections could not have been written without the reports of **Dr. Tony Phillips** at [www.spaceweather.com](http://www.spaceweather.com). Thank you all!

- **Ramaswamy**

**NHAS October 2015 Business Meeting Report**

The monthly business meeting was held at MSDC, Concord NH on October 9th, with our President **John Bishop** presiding. The meeting was kept short to devote the bulk of the time to **Ed Ting's** presentation to the public about how to choose a good inexpensive telescope for a Christmas gift.

**President's Report**

A walk-through and new members' orientation is planned by **Pat Adams** for Saturday Oct. 10 at YFOS.

We still need a coordinator for the pot-luck in December.

The annual Election looms as well; nominations will open in our next meeting to elect a President, Vice President, Secretary, Treasurer and a Director.

**Astronomy Shorts**

*Rags:* did first light on a 32-year-old Coulter 17.5" Newtonian, un-used and in original condition.

*[The .5" is important. <wink> -Ed.]*

**The Evening Presentation**

The talk went well, but as **John Bishop** reported in the Forum:

*Despite all our publicity, only three*

*members of general public showed up: a grandparent who fit our desired profile for the audience and a couple who already had a scope and were more knowledgeable. All 3 had found the presentation based on a Google search that led them to the NHAS page with the banner. It looks as if the banner was a success; the Hippo announcement and the library flyers were not. The people who buy 'trash scopes' don't Google; we don't need to try to run this event again.*

**NHAS Treasurer's Report**  
*(as of October 7, 2015)*

<b>Starting Checking Balance:</b>	<b>\$13,359.84</b>	<b>Membership:</b>	<b>40</b>
			<b>Single + Family</b>
<b>Deposits:</b>			<b>or Student</b>
Membership	1,139.19	Cash Renewals:	12x30.00+2x10.00 380.00
Donations	587.19	Cash New Members	0x30.00+0x10.00 0.00
Interest	0.33	PayPal Renewals:	18x28.83+6x 9.61 576.60
<b>Total:</b>	<b>\$1,726.71</b>	PayPal New Members:	6x28.83+1x 9.61 182.59
		<b>Total:</b>	<b>36 \$1,139.19</b>
<b>Expenses Paid:</b>		<b>Current Members:</b>	<b>76</b>
Rackspace Cloud (Web site)	59.92	<i>[11 Family memberships; 50 members paid by PayPal]</i>	
Rymes Propane and Oil	134.51	<b>Donations:</b>	
Kalmbach Publishing (Calendars)	233.82	Peter Wolczko, Amherst NH	GEN 50.00
Sky Publishing (new Member subscriptions)	65.90	Logo Sportswear, Wallingford CT	GEN 52.19
<b>Total:</b>	<b>\$494.15</b>	Nesmith Library, Windham NH	LTP 325.00
<b>Current Checking Balance:</b>	<b>\$14,592.40</b>	Robert Sweeney, Rye NH	EOC 20.00
<b>Petty Cash:</b>	<b>\$100.00</b>	John Bishop, Nashua NH	GEN 20.00
<b>Current Cash Balance:</b>	<b>\$14,692.40</b>	Larry Daddario, Nashua NH	GEN 100.00
		Mike O'Shaughnessy, Nashua NH	GEN 20.00
		<b>Total:</b>	<b>\$587.19</b>
<b>New Members:</b>			
Anton Ermakov	Cambridge MA	Karl Dahlen	Milford NH
Robert Keenan	Windham NH	Dave Schleicher	Portsmouth NH
Steven Panish	Milton NH	Meagan Gaudette	Merrimack NH



**How to Borrow a Loaner Scope in 3 Simple Steps**

- Contact the custodian of scope you're interested in
- Arrange to meet for the transfer (usually at a monthly Business Meeting)
- Sign the requisite papers and leave with the scope

**It is a benefit of your membership in NHAS.** The loan will be for 2 months; an extension might be granted if no one else is waiting for the unit. The objective is to help new members get to know what will suit them personally, to experiment with options and to understand **what will work** in the time available to them to pursue their new hobby, and equally, **what may not**. A suitable (beginner's) telescope is invariably one that is easy to transport to the observing site and easy to setup, and not necessarily the one with the most aperture or sophistication.

**Orion Starblast 4.5 – LTP-style Telescope**

**Custodian:** Pete Smith  
**Contact:** [psastro60@gmail.com](mailto:psastro60@gmail.com)

**Equipped with:**

Commercial red-dot finder with a special Joel Harris mount.

Celestron 8mm-24mm zoom EP, plus 17mm and 6mm EPs.  
A red/white Headlamp and a Lens Cleaning Pen in the pouch.  
A simple Collimation Cap to learn to collimate the old way.  
A Planisphere, a Moon Map and Richard Berry's "Discover the Stars" Instruction booklet and an Audubon constellations guide.

**Lunt LS60THα/B600PT H-alpha Solar Telescope**

**Custodian:** Pete Smith  
**Contact:** [psastro60@gmail.com](mailto:psastro60@gmail.com)

**Equipped with:**

Tele Vue Sol Searcher  
Celestron 8mm-24mm Zoom EP

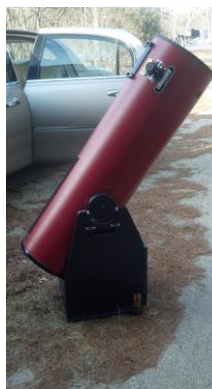
Feathertouch focuser for smooth and precise focusing.  
Celestron CG-4 EQ Mount with RA/Dec. motor drives and controller.  
Sun screen to shade the observer, a Marc Stowbridge special.  
Booklet with quick start instructions.  
Foam-lined custom hard case for the OTA.

**Orion XT6 – 6” Newtonian on a Dobsonian mount**

**Custodian:** Tom Cocchiaro  
**Contact:** [tomcocchiaro@comcast.net](mailto:tomcocchiaro@comcast.net)

**Equipped with:**

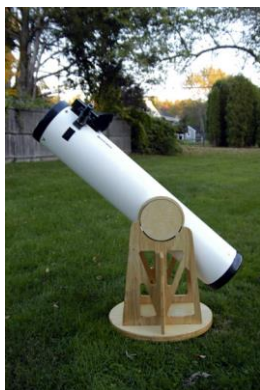
Telrad finder with a dew shield  
32mm, 25mm and 10mm Plössl  
EPs in a case  
A Planisphere, Moon map, red light  
Orion XT6 user manual  
Richard Berry's "Discover the Stars"

**Coulter Odyssey 10” Newtonian on a Dobsonian mount**

**Custodian:** "Rags" Gilmore  
**Contact:** [nhas@ragnorok.net](mailto:nhas@ragnorok.net)

**Equipped with:**

Telrad finder with a dew shield  
26mm TeleVue Plössl and  
15mm Celestron Plössl in a case  
A Planisphere and a Moon map  
Richard Berry's "Discover the Stars"  
*Also available in a separate slip-case:*  
Sky Atlas 2000.0 by Wil Tirion and Sinnott  
Sky Atlas 2000.0 Companion by Robert Strong and Roger Sinnott

**Meade 8” Newtonian on a Dobsonian mount**

**Custodian:** Scott McCartney  
**Contact:** [Scott\\_McCartney@nhb.uscourts.gov](mailto:Scott_McCartney@nhb.uscourts.gov)

**Equipped with:**

Telrad finder with a dew shield  
25mm and 10mm EPs  
A custom-built base (made by  
Joe Derek and Chase McNiss)

**Orion XT10 Newtonian on a Dobsonian mount**

**Custodian:** Pete Smith  
**Contact:** [psastro60@gmail.com](mailto:psastro60@gmail.com)

**Equipped with:**

Telrad finder  
Assorted EPs: 35mm, 25mm  
wide-angle, 17mm and  
a mystery one (25mm?).  
An EP case  
Richard Berry's  
"Discover the Stars"

**Regional Astronomy Clubs**

**New Hampshire Astronomical Society**  
[NHAS] *Skywatches around the State*  
*Sidewalk Astronomy in Portsmouth*  
[www.nhaastro.com](http://www.nhaastro.com)

**Amateur Astronomical Society of Rhode Island** (North Scituate, RI)  
[www.theskyscrapers.org](http://www.theskyscrapers.org)

**Amateur Telescope Makers of Boston**  
(Westford, Mass.)  
[www.atmob.org](http://www.atmob.org)

**Astronomy Society of Northern New England** (Kennebunk, Maine)  
[www.asne.org](http://www.asne.org)

**Gloucester Area Astronomy Club**  
(Gloucester, Mass.)  
[www.gaac.us](http://www.gaac.us)

**McAuliffe-Shepard Discovery Center**  
[MSDC] (Concord, NH)  
*First Friday Observing Event*  
[www.starhop.com](http://www.starhop.com)

**Northeast Kingdom Astronomy Foundation** (Peacham, VT)  
[www.nkaf.org](http://www.nkaf.org)

**North Shore Astronomy Club**  
(Groveland, Mass.)  
[www.nsaac.org](http://www.nsaac.org)

**Penobscot Valley Star Gazers**  
(Bangor, Maine)  
[www.gazers.org](http://www.gazers.org)

**Online Live Observatories**

**Astronomy Live** (broadcasts)  
[www.astronomylive.com](http://www.astronomylive.com)

**SLOOH** (Tenerife, Canary Is.)  
[www.slooh.com/about.php](http://www.slooh.com/about.php)

**Worldwide Telescope**  
[www.worldwidetelescope.org](http://www.worldwidetelescope.org)

**Magazines**

**Astronomy**  
[www.astronomy.com](http://www.astronomy.com)

**Sky & Telescope**  
[www.skyandtelescope.com](http://www.skyandtelescope.com)

**Astronomy Gear**

**Adorama**  
[www.adorama.com](http://www.adorama.com)

**Agena AstroProducts**  
[www.agenaaastro.com](http://www.agenaaastro.com)

**Astromart**  
(Used equipment and advice)  
[www.astromart.com](http://www.astromart.com)

**Astronomy-Shoppe**  
(in Plaistow, NH 03865)  
[www.astronomy-shoppe.com](http://www.astronomy-shoppe.com)

**Celestron**  
[www.celestron.com](http://www.celestron.com)

**Cloudynights**  
(Used equipment, Articles, Forums and Reviews)  
[www.cloudynights.com](http://www.cloudynights.com)

**Explore Scientific**  
[www.explorescientific.com](http://www.explorescientific.com)

**High Point Scientific**  
[www.highpointscientific.com](http://www.highpointscientific.com)

**Kendrick Astro Instruments**  
[www.kendrickastro.com](http://www.kendrickastro.com)

**Lunt Solar Systems**  
[www.luntsolarsystems.com](http://www.luntsolarsystems.com)

**Meade Instruments**  
[www.meade.com](http://www.meade.com)

**Oceanside Photo & Telescope**  
[www.optcorp.com](http://www.optcorp.com)

**Orion Telescopes**  
[www.telescope.com](http://www.telescope.com)

**ScopeStuff**  
[www.scopestuff.com](http://www.scopestuff.com)

**Stellarvue**  
[www.stellarvue.com](http://www.stellarvue.com)

**TeleVue**  
[www.televue.com](http://www.televue.com)

**Vixen Optics**  
[www.vixenoptics.com](http://www.vixenoptics.com)

**William Optics**  
[www.williamoptics.com](http://www.williamoptics.com)

**Astronomy Web Sites**

**CalSky**  
(Sky Calendar to plan Observing)  
[www.calsky.com](http://www.calsky.com)

**Free Star Charts**  
(Star Charts for MM, Planets etc.)  
[www.freestarcharts.com](http://www.freestarcharts.com)

**Heavens Above**  
(on Satellites, Spacecraft, Planets)  
[www.heavens-above.com](http://www.heavens-above.com)

**NASA**  
[www.nasa.gov](http://www.nasa.gov)

**Dark skies Observing Sites**  
(Horizons and Clear Sky information)  
[www.observingsites.com](http://www.observingsites.com)

**ScopeReviews**  
(Reviews by Ed Ting, NHAS)  
[www.scopereviews.com](http://www.scopereviews.com)

**Sloan Digital Sky Survey DR10**  
<http://skyserver.sdss3.org/>

**SpaceWeather**  
(Solar activity, Asteroid passes)  
[www.spaceweather.com](http://www.spaceweather.com)

**Computer Software**

**Cartes du Ciel** (*aka Skychart*) (Free)  
[www.ap-i.net/skychart/](http://www.ap-i.net/skychart/)

**Celestia**  
[www.shatters.net/celestia](http://www.shatters.net/celestia)

**Computer Aided Astronomy** (Free)  
[www.astrosurf.com/c2a/english/](http://www.astrosurf.com/c2a/english/)

**Earth Sky Tonight**  
[www.earthsky.org/tonight](http://www.earthsky.org/tonight)

**SkyMap Online**  
[www.skymaponline.net](http://www.skymaponline.net)

**Starry Night**  
(many versions, Novice to Expert)  
[www.starrynight.com](http://www.starrynight.com)

**Stellarium** (Free)  
[www.stellarium.org](http://www.stellarium.org)

**WinStars** (Free)  
[www.winstars.net/english/](http://www.winstars.net/english/)

Event	Date	Time	Location
Epping Middle School Skywatch	Tuesday, November 3	7:00pm	33 Prescott Road, Epping NH
Bethlehem Public Library Skywatch	Wednesday, November 4	6:30pm	2245 Main Street, Bethlehem NH
Epping Middle School Skywatch (backup date)	Thursday, November 5	7:00pm	33 Prescott Road, Epping NH
First Friday Skywatch for MSDC	Friday, November 6	7:00pm	MSDC, Concord NH
GSAMA Aviation Day Skywatch	Saturday, November 7	9:00am	Concord Municipal Airport, Concord NH
Reeds Ferry School Skywatch	Tuesday, November 10	6:30pm	Lyons Road, Merrimack NH
Southeast Land Trust (SELT) Skywatch	Wednesday, November 11	6:30pm	Ten Rod Farm, 195 Ten Rod Road, Rochester NH
Southeast Land Trust Skywatch (backup date)	Thursday, November 12	6:30pm	Ten Rod Farm, 195 Ten Rod Road, Rochester NH
NHAS Business Meeting	Friday, November 13	7:30pm	St. Anselm College, Manchester NH
Coffee House Night at YFOS	Saturday, November 14	5:00pm	YFOS
Rey Center Skywatch	Saturday, November 14	6:30pm	Waterville Valley NH
Kimball Library Skywatch	Tuesday, November 17	6:30pm	5 Academy Avenue, Atkinson NH
Bethlehem Public Library Skywatch (backup date)	Wednesday, November 18	6:30pm	2245 Main Street, Bethlehem NH
Sidewalk Astronomy Skywatch	Saturday, November 21	6:00pm	Market Square, Portsmouth NH
Boy Scout Troop 11 Skywatch	Saturday, November 21	7:00pm	Camp Wilmot, Wilmot NH
Nashua Winter Stroll Skywatch	Saturday, November 28	5:00pm	Main Street, Nashua NH
John Stark High School Skywatch	Thursday, December 3	7:00pm	618 N Stark Hwy, Weare, NH
First Friday Skywatch for MSDC	Friday, December 4	7:00pm	MSDC, Concord NH
Alton Central School Skywatch	Tuesday, December 8	6:30pm	41 School Street, Alton NH
Alton Central School Skywatch (backup date)	Wednesday, December 9	6:30pm	41 School Street, Alton NH
NHAS Business Meeting + Election	Friday, December 11	7:30pm	MSDC, Concord NH
Coffee House Night at YFOS	Saturday, December 12	5:00pm	YFOS
Rey Center Skywatch	Saturday, December 12	6:30pm	Waterville Valley NH
Goffstown High School	Monday, December 14	6:00pm	27 Wallace Road, Goffstown NH
Greenville Homeschool Skywatch	Wednesday, December 16	7:00pm	TBD
Henry Wilson Memorial School Solar Observing	Friday, December 18	9:00am	51 School Street, Farmington NH
Sidewalk Astronomy Skywatch	Saturday, December 19	6:00pm	Market Square, Portsmouth NH
Portsmouth First Night Skywatch	Thursday, December 31	6:00pm	Market Square, Portsmouth NH
<b>Happy New Year!</b>			

**Note:** Please check [\[Calendar\]](#) at [www.nhastro.com](http://www.nhastro.com) for up-to-date information on upcoming events.



Date	Time	Lunar Phase
Tuesday, November 3	7:24am <b>EST</b>	☾ Last quarter
Wednesday, November 11	12:47pm	● New moon
Thursday, November 19	1:27am	☽ First quarter
Wednesday, November 25	5:44pm	☽ Full moon
Thursday, December 3	2:40am	☾ Last quarter
Friday, December 11	5:29am	● New moon
Friday, December 18	10:14am	☽ First quarter
Friday, December 25	6:11am	☽ Full moon

**Credits**

Contributors to this month's **Observer:**

Patrick Adams, John Bishop, John Blackwell, Pat Bourque, Herb Bubert, Jeremy Burton, Nancy Byrd, *Glenn Chaple*, John Desbiens, *Melody Sky Eisler*, Gardner Gerry, "Rags" Gilmore, *David Hathaway*, Larry Lopez, Rob Mack, Matt Marulla, Todd Nelson, Doug Novielli, Steve Panish, *Tony Phillips*, Steve Rand, Denise Rosander, Dave Schleicher, John Shonle, Marc Stowbridge, *Mia Stålnacke*, Ed Ting, Glenn Tonnesen, Mike Vaccaro, Bob Veilleux, Paul Winalski and *Paul Zizka*.

**Contact Information**

<p><u><i>How to join NHAS</i></u></p> <p><b>Write to us:</b>     <b>NHAS</b>  <b>P. O. Box 5823</b>  <b>Manchester, NH 03108-5823</b></p> <p><b>Send Email to:</b>    <a href="mailto:info@nhastro.com">info@nhastro.com</a></p> <p><b>Visit our web site:</b> <a href="http://www.nhastro.com">http://www.nhastro.com</a></p> <p><u><i>How to contribute to the Observer</i></u></p> <p><b>Email articles and snapshots to the Editor:</b></p> <p>                          <a href="mailto:ramax.astro@yahoo.com">ramax.astro@yahoo.com</a></p>	<p><b>NHAS Officers:</b></p> <p><b>President:</b>            <a href="#">John Bishop</a>  <b>Vice-President:</b>    <a href="#">Tom Cocchiaro</a>  <b>Secretary:</b>           <a href="#">Paul Winalski</a>  <b>Treasurer:</b>          <a href="#">David "Rags" Gilmore</a></p> <p><b>Board of Directors:</b></p> <p>                                  <a href="#">Ken Charles</a>                                    <a href="#">Pete Smith</a>                                    <a href="#">Steve Rand</a></p>
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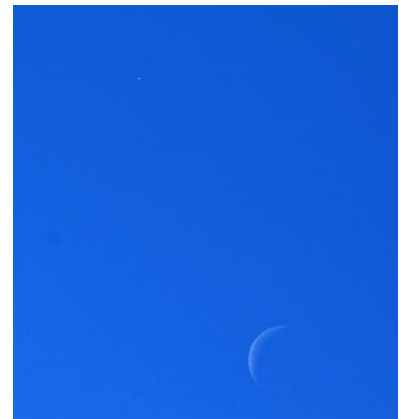
**The Ultimate Filler Item: A 'CBET' that worked!**

**Sent:** Thursday, October 08, 2015 12:11 PM  
**Subject:** [NHAS] Venus at noon

If you haven't had the opportunity to see Venus with the naked eye in blazing daylight, today's your chance! Find the crescent moon which is now high in the southwest sky. Venus is blazing away about four moon-widths to its upper left.

Clear skies!  
**Rob Mack**

*[Many members reacted to the alert and saw the spectacle. John Blackwell imaged the two objects with a 200mm telephoto lens for everyone else to see. If you can't see it even after zooming in a bit, check out the link above. -Ed.]*



Venus and a crescent Moon in daylight. (Image: John Blackwell)