OBSERVER

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In This Issue…

President's Message

Dear Friends,

This month a very old friend has left the astronomy community, while a very new acquaintance has appeared in the sky.

How many people know what a "Dob" is? Of course, pretty much every one does these days. In fact this simple alt-az telescope mount for a reflector, called a Dobsonian mount, was invented by John Dobson, who passed away this month at the age of 98.

The name "Dobsonian" or "Dob" has almost taken over as the common name for the Newtonian reflector on such a mount. (Not that fans of Isaac Newton need worry about him being forgotten!) Dobson lived a life of simple needs, but his most intense interest was in sharing the views of the universe with others. He co-founded the Sidewalk Astronomers in San Francisco and spent many nights on the street corners of that city with scopes he constructed himself, right down to the mirrors. He taught mirror grinding classes well into his 90's and never stopped being an enthusiastic advocate for sharing with the public. Many of you met him in person at Stellafane and other events over the years. He will be missed. This year's International Sidewalk Astronomy Night (ISAN 2014) on March 8th is being dedicated to his memory. So if you can, take your "Dob" out and share the views with some folks that night, and say thanks to John. Weather permitting, the Portsmouth sidewalk team will be gather in Market Square.

As if to mark John Dobson's departure, a supernova (SN 2014J) has appeared in the nearby galaxy M82, also known as the Cigar Galaxy. The star was first noticed on January 21st but analysis of pre-discovery images confirms that the explosion happened on January 15th, the date of John Dobson's passing. This galaxy, "only" 12 million light-years away and consisting of billions of stars, is now host to a single star which is temporarily outshining the entire galaxy!

Many club members have taken images of this event (see the Pictures Forum), and as of this writing the supernova is visible in scopes 8" in diameter and under good conditions probably down to 6". I hope many of you had a chance to see it visually or at least to look at some of the before-and-after photos online. It appears to be a Type Ia supernova, a kind of outburst which tends to be of a fixed brightness *(read the Supernova article in the December 2013* **Observer***)*. Knowing something is of a fixed brightness is useful since if one Type Ia supernova appears dimmer than another Type Ia, the dimmer one is definitely farther away, and the rule of intensity diminishing as the square of the distance can be used to find the ratio of distances between the two. Powerful stuff from just a few photons of light!

Fourteen new members have joined NHAS in the past 2 months. I hope they will find everything they are looking for among the great programs and wonderful members we have in the club. We hope to welcome some more of them at the next meeting, so please take a moment to find them and say "Hi."

Finally, let us all keep our brother Rich Schueller in our thoughts and prayers as he recovers from his recent surgery.

Clear skies,

Ted Blank
NHAS President

First Night, Portsmouth NH, December 31, 2013 – January 1, 2014

With my buddy **Jim Moe,** I joined other NHAS members **Herb Bubert, Tom Cocchiaro, Gardner Gerry, Rex Gallagher** and **Gerry and Peter Smith** to brave the cold and crowds for another great night at First Night. There were a few clouds until about 5pm, and one 15-minute period of passing clouds, but after that it was clear skies. Tom arranged the parking for us, and then managed about a half hour of showing the crescent Venus before it set. We then set up the tent, tables, handouts and scopes for the expected crowds.

The NHAS Pavilion

They showed up right on schedule, and enjoyed views of the Pleiades and a few other Deep Sky objects until Jupiter finally rose above the buildings on the east side of Pleasant Street. Lines were sometimes 10 to 15 deep at the scopes in the early evening. The view of M42 in **Herb Bubert's** *StarMaster* was breathtaking, both with and without the OIII filter.


And the really starry show played on…
(All photos: Ted Blank)

After the fireworks display things quieted down a bit (probably due to dropping temperatures) but our intrepid band stayed on right through midnight and still had a steady stream of "customers." Dancing around the scopes to the music of the DJ's up on the corner probably kept us from getting frostbitten. Tina brought hot pizza around 9pm to keep us going, then dashed back home to warm up. Just as we were packing up around 12:30pm, new member **David Getman** stopped by and took possession of the XT6 loaner scope (as arranged in advance). First Night brought some amazing costumes, lots of eyeglasses with flashing LEDs, and no shortage of oohs and aahs at Jupiter with all 4 moons on one side of the planet.


First Night, First Job, First sentry duty.
Pete Smith manning the NHAS booth.

Rex Gallagher showed up straight from the wedding ceremony of his daughter Tracey on the beach at Rye, NH. Best wishes to the newlyweds and a bright start to their new life! Rex spelled Tom a 20 min break and showed off Jupiter in the 9 1/4" Celestron, a really crisp image with the 4 moons arrayed on the same side (and it bears repeating) that led to plenty of wows from the spectators.

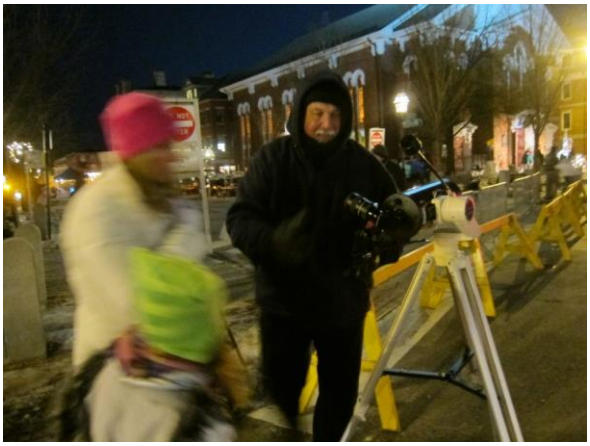
Thanks to everyone who participated and a Happy New Year to all of our members and families.

- ***Ted Blank***

New Year, New Job, New First Look!
(Photo: Tina Blank)

Herding these cats was easy, and First Fun.
(All other Photos: Ted Blank)

(Above): Gardner and Herb get ready for First Revelers.
(Right): Gerry guides a youngster to First Look at Jupiter.



Organizer of the evening Tom Cocchiaro in prime focus, alongside the First Fuzzy Object.

First Night Monadnock, Jaffrey NH, December 31, 2013 – January 1, 2014

Joe Derek and his 12.5" Newtonian; the Gardiners with their 102mm Apogee refractor

The third annual First Night Monadnock was held at the Monadnock Bible Conference (MBC) in Jaffrey, NH. The evening was cold and started out a bit cloudy with snow flurries. By eight o'clock the skies had cleared and there were great views to be had by the 370+ attendees. The key objects of interest were a glimpse of Venus, Jupiter, M81 and M82, the Andromeda Galaxy, the Orion Nebula, the Pleiades and one fire ball.

Manning the binoculars and four scopes were **Joe Derek, Art Gardiner** and his son **Artie**, and former member **Mark Warenda.** In addition to the astronomy, MBC hosted a slew of other activities for the families attending – snow-tubing, music, laser tag, magic show, comedy show, crafts and games, and movies. The evening culminated with an awesome fireworks display put on by Atlas Fireworks.

MBC put us up in their guest lodging free of charge, and provided us with a hearty breakfast in the morning. This is the second year that the NHAS has participated in this event. They enjoyed it so much that they have requested a repeat performance for the next New Year's Eve.

- ***Bonnie Derek***

The trademark 12.5" Newtonian on its EQ mount, and the blue-shrouded 17.5" Newtonian (in the back) on a Dobsonian mount. (All photos: Bonnie Derek)

The 12.5" scope was built in the late 1990's as a dobsonian, and converted to equatorial design. I ground the mirror on this one and also built a table-top machine to help with the polishing. The scope was entered in 1999 at Stellafane as a dobson, the next year as an equatorial design, and again in 2001 with motorized rotating rings.

The 17.5" was built with flex mirror design (to compensate for an under-corrected mirror) sometime in 2004 and entered at Stellafane in 2005. It has a commercially made Coulter mirror purchased by me from Ed Dougherty's wife Cynthia (after he passed away). Ed was a former NHAS member and an avid telescope builder who excelled at innovative designs.

My experience in astronomy has been influenced by many people from NHAS: **Mike Stebbins, Larry Lopez, Joel Harris, Don Ware, Chase McNiss, Ed Dougherty** and others. A great hobby shared by great people!

- ***Joe Derek***

[**Mike Stebbins,** a past President of NHAS (1997-98), recounts a day spent with the late John Dobson on page 7. Here he talks about his 24 inch f/4 Sky Designs scope on a Dobson mount. – *Ed.]*

In my experience, the 24 inch was amazing, but required good to excellent seeing, which is rare here. At low power it would only show 1/2 a degree of sky – this was a deep space scope (read Ed Ting's review of it). But when it worked, it worked great for deep space objects like galaxies. I was amazed at it showing 4 separate nebula structures in the Omega nebula complex *[M17 in Scutum/Sagittarius]*. It also gave great planetary views when stopped down to 9 clear inches off axis, Mars and Jupiter in particular.

But towards the end the scope was not getting used a lot, so it found a new home out West. I sold it to an engineer in Salt Lake City. He and his wife were nice enough to drive to Manchester, NH and pick it up. They offered to let me use it in Salt Lake anytime I liked. I had done what I wanted to with it over the 4 years I owned it. I have moved to a smaller, easier to handle and store scope – a 4" Vixen refractor that I use to observe the Sun with from time to time. I have a very nice 10" mirror, and am building a scope as a long term project to host it. A 10" mirror can get you out there pretty well too.

You have to face the fact that the internet can deliver better views than you can ever get in an amateur scope. This was not the case in the 1990's. And yet, there is just something inspiring about seeing it live that cannot be matched by a CCD camera image.

- ***Mike Stebbins***

I have always wanted to make a telescope mirror, and in the Stellafane Kids Raffle of 2001, my daughter Kristin won a mirror grinding kit. Her brother Brian won a similar kit in 2005. That naturally put pressure on someone to actually grind these mirrors. Of course that someone was me. My other son Ian bought an incomplete mirror at the 2006 swap meet.

Three mirrors: one complete, two left to go (in 2006).

Working on the trio pretty much at the same time allowed for economy of scale. In the photo (bottom right) I'm polishing in the bathroom, where there is running water, counter space, and the ability to heat the room to the temperature required to parabolize relatively fast mirrors. With an available counter, the traditional grinding barrel is reduced to a simple wood disk on three rubber feet. I had always thought making a mirror would take a long time, but I was surprised to find out that it took less time to make the mirror than to make the mount.

Joe polishing Kristin's mirror
(Photos: Maggie and Joe Dechene)

Kristin's scope was entered in 2007 at Stellafane and Brian's in 2008, with both winning optical awards. Currently I am working on Ian's scope, who wants an equatorial.

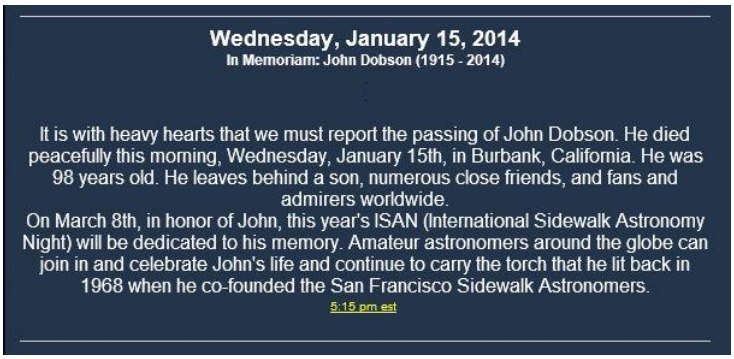
Kristin's scope

Brian's scope

- ***Joe Dechene***

[**Joe Dechene** took ***First Place*** for Mechanical Design, Stellafane 2002. -*Ed.*]

A sombre notice posted on January 15th at the website of Sidewalk Astronomers informed the world. John Lowry Dobson had breathed his last that morning.



(courtesy: The Sidewalk Astronomers)

He was born in Beijing (then Peking), China on September 14, 1915. His father taught at the University of Peking, but by 1927, the continuing unrest in China had forced the family back to the US, where they settled in San Francisco. While his father taught at Lowell High School (well into the 1950s), the young John enrolled at the University of California, Berkeley in 1934, for a decade of frequently interrupted studies. He graduated in 1943 with a degree in Chemistry and Mathematics, and went to work for the defense industry at both Caltech and the Berkeley Radiation Laboratory (later the Lawrence Berkeley Laboratory). Then in May 1944, his life changed abruptly, after he attended a service at a Vedanta Monastery in San Francisco and decided to join the Ramakrishna order and become a monk. Legend has it that 1944 was the last year for which he ever had to file an income tax return. He spent the next 23 years with the Order – his first assignment was reconciling the teachings of religion with those of science. And in due course, he decided to see for himself what the Universe looked like.

John Dobson built his first telescope in 1956. It was a 2" refractor made from a lens he got in a junk store and an eyepiece from an old pair of Zeiss binoculars; through it, he could see the rings of Saturn. John made his first mirror out of a marine-salvage porthole glass. When he looked at the third-quarter moon with his finished telescope, he was surprised and deeply moved by what he saw – "everybody has got to see this" became his motto. Thus began John Dobson's long commitment to public service in astronomy.

John Lowry Dobson (1915-2014)
(courtesy: Wikipedia)

After being transferred to the Monastery in Sacramento in 1958, he constructed a 5-inch reflector, the mirror made from the cut-out bottom of a discarded gallon jug. He then appears to have contracted aperture fever, making larger mirrors using salvaged portholes, smuggled into the monastery in fertilizer boxes. He would screen his own sand for grinding and made his own rouge out of garden supplies. The job of grinding mirrors was done under water to deaden the sound, to not attract the attention of some detractors in the monastery. A monk with no money, he constructed his telescopes using discarded hose reels, lumber core cut-outs from school house doors, and scrap wood.

Such was the humble origin of what is now known as the "Dobsonian" telescope – a Newtonian telescope with a type of alt-azimuth mount that is simplicity itself – it moves up and down, left and right.

Its inventor taught that by spending as little as possible on the mount, one could afford a bigger mirror and a better scope. In his book *Seeing in the Dark*, Timothy Ferris writes: "The amateur astronomy revolution was incited by three technological innovations – the Dobsonian telescope, CCD light-sensing devices, and the Internet." When asked about the "Dobsonian Revolution," John Dobson usually replied that all previous revolutions were fought with cannons on Dobsonian mounts.

That Mirror Making Day

On the cloudy Fall Saturday that was September 28th 1996, **John Dobson** participated in a mirror grinding exercise with members of NHAS. The 10" blank was donated by **Mike Frascinella.** The activity took place at the home of **Bert Bingel,** the then NHAS President.

Recollections of that day, as well as of chance encounters with the man by other NHAS members, follow.

John Dobson with members of NHAS, and the mirror in question. (Photo: Bert Bingel)

Bert Bingel leads the way:

John Dobson was certainly a character. As I recall, he was delivered to my house by a member of a club in Mass. the night before the mirror grinding session. The NHAS group to Angelo's restaurant in Manchester and John stayed with the Stebbinses for the 2 nights.

On grinding day, we met at my house in Manchester West for the marathon mirror making session. We set up a couple of saw-horses, a plank and a garden hose in my driveway. From there Dobson, ever the Drill Sergeant, led us through to quickly hog out the mirror. We used multiple grits and copious amounts of very cold water from the hose. He was very commanding figure and often shouted out comments like "No! You're not going fast enough!" "Put more force into it." "That's not right!" Quite surprising, coming from someone who claimed such a calm, monkish persona.

We had planned on eating after the session, so at one point I was in my kitchen preparing the food. I was crouched down getting a pan from a lower cabinet when the door flew open and in races John Dobson. He flew over me like an Olympic hurdler to get to the sink where he proceeded to get a pitcher of water, all the while shouting about how something or other wasn't going right. After the mirror was "configured" to his specs, we were all sitting about on my front yard when John started to selectively eat the weeds. I told him that we used fertilizer and we couldn't guarantee our cats haven't been there.

An interesting day to be sure.

Joel Harris (holding up the mirror above) adds:

The mirror had already been rough-ground to 220 grit. He overheard me telling someone there that a 320 grit has 180-400 grit in it. He was angry, believing that we should have started with a coarser grit size.

Mike Stebbins continues the narrative:

John Dobson was in the area doing an event in Cape Cod for a kids' school. The club down there had loaned him to us for the weekend. He came to our scope building event on Saturday, at Bert Bingel's house.

We talked about his Sidewalk Astronomers, on how he was kicked out of monkhood over it. He built mirrors out of ship portal glass (never used tempered portals), and refined his own grits by settling them out in water. His "Dobsonian" mount used a phonograph LP record on the base board as a base for Teflon to slide on. He towed the scope around on a kid's wagon, which also made a good observing height for kids at sidewalk astronomy.

John spent 2 nights at my house; he tended to eat soft boiled eggs for meals when left to himself (and which he demonstrated for me). On the Sunday, he spoke at CMP (now MSDC) on his mirror grinding and telescope making, and his thoughts on the nature of the Universe. His views on God and the Universe are not widely accepted, and his talks tended to wander into them.

He went back to Cape Cod that evening.

Andy Jaffe shares his impressions:

As a group, we had hours to talk with John, a very different experience than a chat at Stellafane of a few minutes. His stories about making his first scopes were fascinating. He screened beach sand to obtain his different grits and used porthole glass and other people's discarded materials to make the scope. You'd only have to look at the size and prices of the Parks scopes available at the time to realize what a wonder it was to think one could make something similar out of these materials. As a mirror maker, he was not a Beck or Fagin (the Zambutos of their time). I think John aimed to make light buckets in a reasonable period of time so he could show people the sky. An optical competition at Stellafane would not have been on his radar. I know the NHAS mirror had a fair amount of surface roughness.

The impression was of a marvelously fit and articulate man appearing much younger than his age. His distinct accent and manner of speech also left an impression. He was obviously a brilliant and confident person. John was dressed simply, but somehow appeared impeccable. There was never any discussion of material things. I think he may have offered to sleep on the floor or a mat at places he was staying. He never once referred to the scopes as Dobsonians.

I did get to ask John a question I had always wondered about. Why are the eyepieces on Dobsonian scopes on the wrong side? It is quite awkward for a right handed individual, usually right-eyed unless cross dominant, to have the eyepiece on the right side of the scope looking from the back. As I'm left handed, it's a boon to me. I was pretty convinced that John, who's right handed, was cross dominant – he was indeed left-eye dominant. He knew immediately what I was talking about. Remarkably, to this day and even though many of these scopes can be rotated 180 degrees on their mounts, they are advertised and used the "wrong way." They are simply set up the way it was most comfortable for John, even though most of the population is right eye dominant.

We got to hear John talk about his rejection of the Big Bang theory. It was odd, and given the way he discussed other topics, right to the point. I guess he had a dislike of this theory in the way Einstein was philosophically opposed to quantum mechanics.

Marion Hochuli remembers the day:

John Dobson gave us a demo on how to grind a mirror and used a simple bench. Many of the attendees took turns at grinding this mirror in Bert's garage. Joel Harris and Bert Bingel set up a lamp shining on a sphere far in the backyard for testing the mirror. At one point during the grinding session, Dobson thought there wasn't enough water in the slurry and with a loud exclamation, dashed into Bert's kitchen for some water. Bert was in there bent over to get something out of a lower cabinet when Dobson rushed in and leaped over him to get to the sink!

Once the mirror grinding on the 10" was finished, we noticed that Joe Derek had already set up shop on Bert's lawn with a small table, saw and carpenter's tools, and was in the process of building a mount for our 6" scope. He demonstrated how to glue laminate to plywood. As Barbara O'Connell, Bert's daughter Sarah and I sat on the lawn watching Joe's fine craftsmanship, John came over and sat down beside us to chat. He picked a few blades of grass and vegetation from the lawn, identified them for us and proceeded to eat them! In spite of the outburst in the garage, we all had a good time and Bert was very generous to have held the event at his house.

I remember thinking that day how limber and agile John Dobson was – notice how relaxed he is in the photo [he was then 81. -Ed.]. At Stellafane my friends and I all thought he needed a crowd around him and be the center of attention. Our event suited him perfectly.

Larry Lopez adds:

Over the years I had seen John Dobson several times at Stellafane, at NEAF and when he made us a mirror.

He seemed uncomfortable when people lionized him in calling it the Dobsonian mount. As the Dobsonian mount does look like a cannon mount (say, the main guns on the Missouri) I think perhaps this made him feel he had not invented anything. Nevertheless, the packaging, low-tech implementation and economy in cost of the mount revolutionized telescopes by letting large, and sometimes very large mirrors, to become portable telescopes.

The rural National Parks never had it so good.

Larry continues his tale:

When John made a mirror for NHAS at the home of Bert Bingel, many NHAS members attended.

He had a lot of hassle making the pitch lap, because we were basically not prepared the way he expected us to be prepared.

I think he expected us to have read his book and that we would have prepared things as he expected. He muddled through and finally made the pitch lap.

Then a bad thing happened.

John: You chipped the pitch lap.
Larry: I chipped the pitch lap!!!
John: You chipped the pitch lap.
Larry: I chipped the pitch lap!!!
John: You chipped the pitch lap.
Larry: I didn't want to chip the pitch lap. I chipped the pitch lap!!!

Everything, more or less, worked out. But Larry has never been the same.

When he spoke, you were mesmerized. He mixed astronomy and science and God. I suspect that many people at Stellafane disagreed with his science or felt he was a throwback to the 60's.

I loved him; he was so alive!!!

John Dobson, about to turn 90, uses paper to help extinguish the candles on a cake at the Stellafane gathering in 2005. The cake was made to look like a giant pitch lap, a device used in making telescope mirrors. (Photo: Dennis di Cicco, reproduced with permission, Sky & Telescope)

Joe Dechene remembers an encounter from his pre-NHAS days:

A long time ago when I lived in Hartford, the Astronomy Society of Greater Hartford had him speak at a meeting and observing. At his talk at Gengras Planetarium, he shed some of the credit for the design, terming the Spitz STP planetarium projector as on a dobsonian mounting. John gave an interesting talk about telescopes, and uttered the line "newtonian shootonian, refractor shefractor, schmidt, schmidt" – which of course drew laughter from the crowd. But no bones about it, back in those days a 6" f/8 on an equatorial mount was the typical serious gear, and someone with an 8" scope was in the big leagues. Nowadays many members have dobs in the 18"+ aperture range.

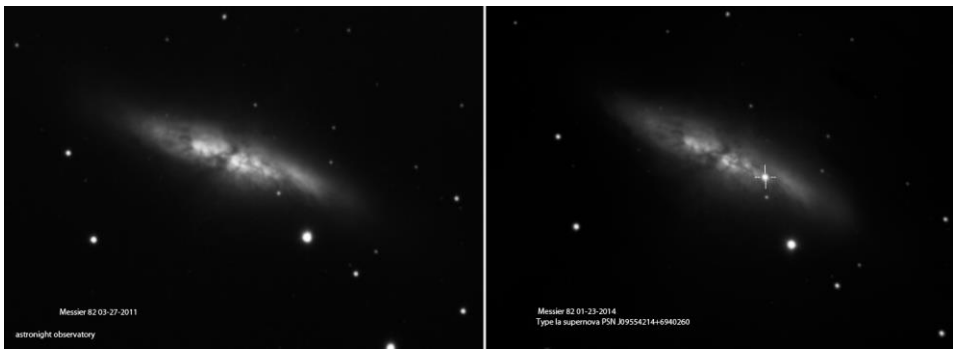
I also saw John Dobson at Stellafane. John had an alternative view of cosmology, dark matter, and the like. I am sure he had put some thought into his theories, but admitted he was on the fringes of what the scientists generally accepted. It will be interesting as our theories evolve over time to see if he was on to something. But John will be best known as a builder of large simple telescopes and delivering views to the masses on street corners.

Andy Jaffe concludes the narrative…

It is somehow fitting that what may well be the best supernova in years has appeared days after John's death. Naturally, I took my Dob out to look at it.

My next size scope has a GEM which doesn't like the cold, and fragile lens glass which cannot be temperature shocked. I wheeled out my Pyrex mirror on a Dob mount and it worked fine.

Somewhere, John Dobson must have been smiling.



Supernova SN 2014J in M82: M82 in 2011, and at present. (Images: John Buonomo)

- ***Ramaswamy***

Heronfield Academy, Hampton Falls NH, January 8

Gardner's Dob at work (Photo: T. Blank)

Gardner Gerry, Tom Cocchiaro and **Ted Blank** participated in this skywatch under a cold but clear sky. Gardner gave an indoor talk to about 25 eager 6th graders from the Heronfield Academy, then the kids came out in 2 shifts to observe Jupiter, the Moon, M31, the double cluster, M42, Castor and several other objects. We had 3 telescopes in use, plus a pair of binoculars for viewing the Pleiades. After the kids went home, we had hot chocolate inside with the teachers. It was a great night.

- ***Ted Blank***

West Manchester Community Library, Manchester NH, January 22

The event was almost a duplicate of last year's at that facility; the temperature was in the low single digits, and so was the number of visitors. **Ted Blank** and **Gardner Gerry** had scopes set up, **Elaine Grantham-Buckley** assisted, and I was set for the presentation. Last year we had 3 or 4 visitors, this year it was two. The library staff is very nice, but I am not sure how much publicity or interest survey they do for the event. Scheduling in warmer conditions might boost participation. As the city viewing conditions aren't the best, I would also make sure we have a planet or 2 on offer, and a 1st Quarter Moon.

- ***Steve Rand***

Rindge Recreation Department, Rindge NH, January 24

Steve Rand and friends (Photo: T. Blank)

For the monthly "Night Out With The Fam" event in Rindge, **Steve Rand, Gardner Gerry** and **Ted Blank** represented NHAS. While Gardner and Steve showed people views of Jupiter and M42 through quickly-clouding skies, I walked around to remind folks skating or enjoying hot chocolate indoors that the scopes were outside, so we had a pretty good flow of visitors. They had free skating on one of the tennis courts, a bonfire and hot chocolate. It was very well attended by the local folks for such a cold night. We are scheduled to return in March, on the night billed as "Weird Science Night," so we should fit right in!

- ***Ted Blank***

Bethlehem Public Library, Bethlehem NH, January 30

Gardner presented to an SRO audience

We had a large crowd (48 adults and kids, quadruple the forecast) for this event north of the Notch. **Gardner Gerry, Elaine Grantham-Buckley, Ramaswamy, Curtiss Rude, Marc Stowbridge** and **Paul Winalski** represented NHAS, and were really mobbed at the beginning. The skies were very clear at 6:30pm, but haze gradually crept in from the Northwest. We got in a good two hour's observing under VERY dark and steady skies – the equal, if not better than YFOS, and this in downtown Bethlehem.

While I was setting up and collimating the 14" TScope, there were 2 Iridium flares within a minute of each other at 6:30. Such sequences are uncommon, but they do happen (I once saw 3 Iridium flares within 2 minutes). The first one was 0 magnitude. As it was fading, the second started, reaching at least magnitude -4. Sadly, none of the public got to see them – they arrived from the indoor presentation just as the second flare was fading out.

I presented Jupiter first, with all four Galilean Moons visible, and switched to a wide-angle view of M35 – among the best views of this object that I've ever had. Next I slewed to M82 to see the supernova. The view of the Cigar Galaxy was excellent; the supernova was dead obvious. I've viewed other supernovae in distant galaxies before (ten or so years ago in M51 for one), but none of them was this prominent and obvious. I needed merely to say, "that star embedded in the left side of the galaxy **shouldn't be there**" and everyone of the public could see it.

Next to R Leporis – usually one of the reddest but dimmest of carbon stars. It must be near maximum brightness; at least, I've never seen it this bright. It's also more orange than usual. Later in the evening I also found W Orionis, showing its usual carbon star redness.

I showed off, in no particular order: M38, M36, M37, the Orion Nebula, M1 – the Crab Nebula, and the Flame Nebula near Zeta Orionis. In passing I noted the Sigma Orionis 7-star system.

It was a truly glorious evening for the public, and a real treat for me. I hope we're invited back.

- ***Paul Winalski***

Gamma (γ) Ceti – Double Star in Cetus

by Glenn Chaple

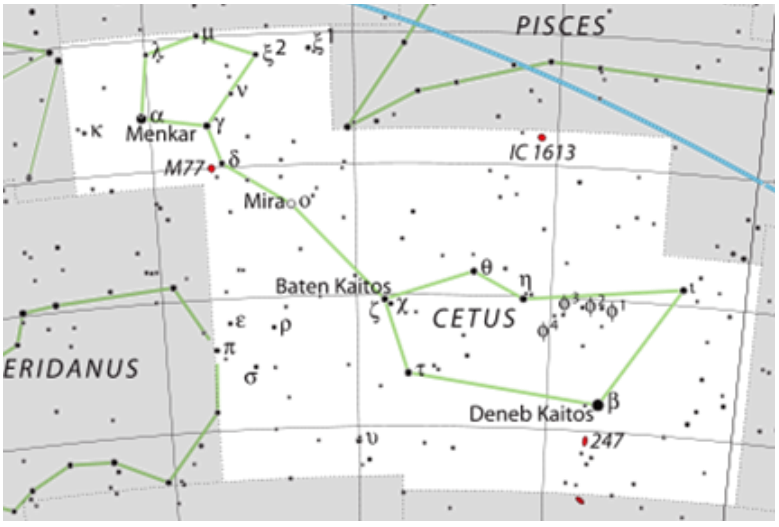
We open the New Year with a double star that is as easy to split as it is to pronounce its Arabic name, *Kaffaljidhma.* We'll simply refer to it by the Bayer designation, gamma (γ) Ceti. Discovered by the German-Russian astronomer F. G. W. Struve in 1825 (it bears the Struve Catalog identity Σ299), gamma Ceti is the southernmost member of a circlet of stars that forms the head of the celestial Whale.

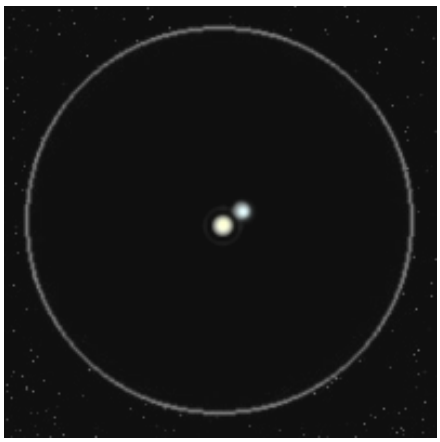
Gamma Ceti's component stars are separated by 2.3 arcseconds, putting them at the resolution limit of a 2-inch scope. However, the primary is 9 times brighter than its partner (magnitudes 3.6 and 6.2), making them a challenge for telescopes with twice the aperture, even under ideal seeing conditions. My first split of gamma Ceti was accomplished with a 5-inch f/12 Maksutov-Cassegrain and a magnifying power of 250X. The companion appeared as a bump on the primary diffraction ring of the main star.

There's an interesting twist to the colors observers report when viewing gamma Ceti. Most note colors of yellowish and blue – the opposite of what you'd expect for a pair whose spectral classes are A3 and F3. These impressions are likely illusory - a result of a contrast effect between a bright primary and fainter companion.

As they say in the TV ads, "But wait, There's more!" A 10th magnitude K-type dwarf situated some 14 arcminutes to the northwest shares the same proper motion as the main pair. All three lie about 80 light years away.

Gamma Ceti is just 3 degrees north of M77 *[Cetus A, a Seyfert galaxy]*. If you happen to be visiting this galaxy and the seeing conditions are favorable, don't depart without giving *Kaffal-whatchamacallit* a try.





Left: Chart from IAU and Sky & Telescope. Above: Sketch of gamma Ceti by P. J. Anway (doublestarobserver.com). Both are oriented with North at the top and West to the right.

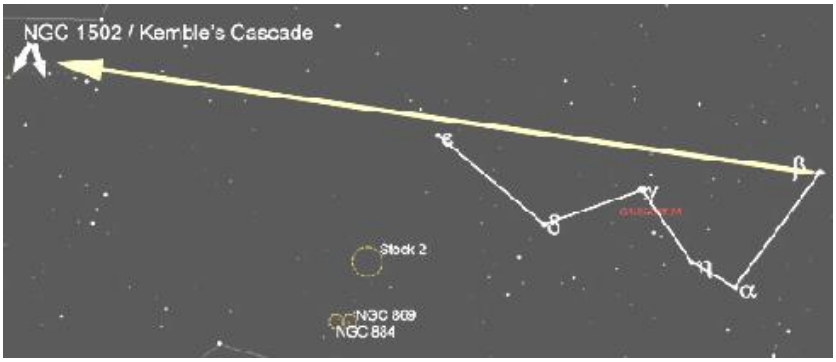
Kemble's Cascade/NGC 1502 – Asterism and Open Cluster in Camelopardalis

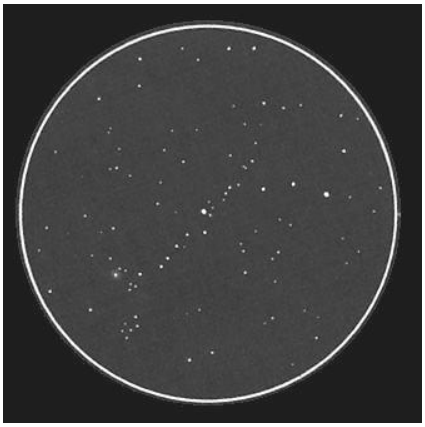
by Glenn Chaple

In 1980, while scanning a rather vacant area of the constellation Camelopardalis with 7 X 35 binoculars, Canadian amateur astronomer Fr. Lucian J. Kemble came across "a beautiful cascade of faint stars tumbling from the northwest down to the open cluster NGC 1502." He reported his finding to *Sky and Telescope* "Deep Sky Wonders" columnist Walter Scott Houston, who featured the remarkable asterism in the December, 1980, issue. Houston appropriately christened it "Kemble's Cascade."

This 2½ degree-long chain is comprised of some two dozen magnitude 7 to 9 stars with a 5th magnitude star at its midpoint. NGC 1502 is visible as a fuzzy patch of light at the southeastern end of the Cascade. This dazzling 8 arcminute-wide open star cluster is comprised of several dozen stars, magnitudes 10 to 11. At its center is the double star Struve 485 (Σ485), a pair of 7th mag. stars separated by 18 arcseconds.

Kemble's Cascade can be found by sweeping your binoculars from beta (β) through epsilon (ε) Cassiopeiae and continuing in a straight line an equal distance beyond. A dark-sky location on a moonless night will help you pick up the fainter Cascade members. Should you decide to view Kemble's Cascade via telescope, work with a rich-field instrument and an eyepiece that magnifies 15-20 times and captures a 3 degree field. NGC 1502 and its embedded double star are best viewed with a boost to 30X or more.





Finder chart for Kemble's Cascade and NGC 1502 (generated with Sky Tools 2 by Capella Soft) Right: **Sketch by Kiminori Ikebe (The Falls of Camelopardalis)**

Glenn Chaple is the author of the monthly **"Observing Basics"** column in ***Astronomy*** magazine. He also writes a column on a **"Sky Object of the Month"** for regional Astronomical Societies, and beginning with this issue, he has very kindly made it available to the NHAS **Observer**. A double column is being published this month to have a complete calendar year set for the year of 2014; henceforth, the month referred to in the column will be one ahead of the date of the **Observer.**

Last summer I stumbled across a veritable treasure trove of articles by Mr. Chaple on double stars, and Chaple's Arc. Check them out at the website of the **Amateur Astronomical Society of Rhode Island.**

- *Ed.*

By now folks must have started to wonder about the size of this issue. Fear not – it is unlikely to become the norm. Truth be told, it was caused by the delay in publishing. I had business to deal with in the last week of January, and other matters got in the way the week after. It is not only objects in deep space that accrete mass. However, chances of my burning out, or going Nova, are exceedingly slim.

And another **John Dobson** story can be told, as related by Barry Peckham in the Hawaiian Astronomical Society newsletter. A week before his passing, John Dobson was taken to a local hospital. Asked by the Admissions Nurse if he was allergic to anything, John summoned up enough energy to reply: "The Big Bang."

In a month of images of gigantic Sunspots, Supernovae and a rock plunked in front of an over-achieving rover by playful Martians, I was most taken by a test shot of the Moon, and it is the *Image of the Month.* You may have already read (on page 5) about a trio of 6" mirrors "figured" by **Joe Dechene** for his kids. The last one, for his son Ian, is still being worked on; while the first two became "dobs," this one will not, in another case of one marching to a different drummer.

Image of the Month

Ian's mirror is polished, but not coated. An uncoated mirror reflects 4% of the light, compared to about 88% by an aluminized mirror. The 22-fold drop in light gathering by the uncoated mirror amounts to a loss of about 3.36 in magnitude. Joe is still trying to decide whether to continue "figuring" from its current very good figure to an excellent one. In the meantime, more star testing is being done with a coma corrector, which requires a slightly over-corrected mirror, as this one is (its curvature is stronger than a paraboloid – the figure of an under-corrected mirror is between a sphere and paraboloid).

Test shot of 1st Quarter Moon, an almost ½ sec. exposure.

Which leads to another Dobson story: He once star-tested a mirror and pronounced it "slightly under-corrected, but smooth." He hastened to add (in case the budding amateur was disappointed at the verdict), "… that's great, because a mirror tends to over-correct when the ambient temperature is falling."

I want to thank Joe for his patience in trying to educate me about the science and art of mirror making, and for his images. In our chats, **Andy Jaffe** informed me of the one point I had in common with the late John Dobson – that of being right-handed and left-eye dominant. And last but not least, I want to thank **Marion Hochuli** for her good counsel, and especially the accidental discovery of a printed copy of the September 1996 issue of the **Observer** (exactly one page long, yes, you read that right!), which allowed us to "fix" the date of the *That Mirror Making Day* – it had been floating between 1995 and 1998. Memories differed, and all this was before the age of online NHAS resources.

I would also like to thank **Tom Cocchiaro** for his videos and **Ted Blank** for his CCTV-style still pictures – they helped me put together the words and images for the *Cleaning Eyepieces* clinic article (next). Thanks as well to **Paul Winalski** for uploading the three videos linked to from the *Sunspots* article.

- ***Ramaswamy***

Gardner Gerry grapples an EP; Tools of the trade: Bulb, Brush, Alcohol and lots and lots of Q-tips.

Cleaning Eyepieces

As part of the evening program at the January Business Meeting, **Gardner Gerry** conducted an eyepiece cleaning clinic. Among the compromised units presented to him were a 32mm Meade Wide Angle, a 27mm Panoptic, a 9mm Expanse and a 4mm Burgess. EPs with fingerprints and mascara were nothing compared to the "epic": Paul Winalski's 32mm TeleVue Plössl, the frosted one.

The implements were fairly straight-forward: a **Bulb** for puffing air, a camel-hair **Brush**, a bunch of **Q-tips** for one-time use, and pure **Isopropyl Alcohol** in a bottle with a dropper.

The Cleaning Fluid

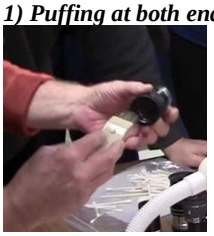
Acetone can be used in place of alcohol – it works faster and dries faster than alcohol, but it is also a known carcinogen and has to be dealt with care, especially the fumes. And although it can be used successfully on many coatings, acetone may present a risk in some cases. If the barrel is made of plastic, it cannot be used; if any lettering at the top is in paint rather than anodized, acetone is not an option. Alcohol is safer on all counts and does the job well. Rubbing alcohol should not be used, since it usually has about 30% in additives that might present problems.

A fingerprinted EP & the epic 32mm Plössl. (All Photos: Ted Blank and Tom Cocchiaro)

The Blowing and Brushing tools

A hand-operated bulb is the best blower – a cheap, manually operated device that will never run out of air. A pressurized can should never be used because the propellant can damage coatings. The bulb is used first to blow any dust or debris than can be. The brush is next; its bristles should be soft, preferably camel-hair. Never touch the tips of the brush; avoid transfer of finger oils. The tips can be 'cleaned' by light brushing against one's (laundered) shirt or blouse; no other 'cleaning' is required.

1) Puffing at both ends, with gravity assist.



2) Brushing with rapid, but gentle stokes

The Cleaning

The Q-tips should not be fluffy, and should be used for only one swipe. One or 2 drops of isopropyl alcohol will be used per tip. Breathe on the eyepiece surface to deposit a layer of "distilled water" and then swipe ***very gently*** by rolling the Q-tip across the surface. Switch to the other end and repeat the process along a parallel line, with more alcohol and another breath. Switch to a new Q-tip and continue. Gently does it!

3) Alcohol on Q-tip, distilled water on EP

4) Rolling swipes across, and the periphery

Never press down hard against the coating. Also, never try hard to remove foreign material at the edges of the lens – any debris there will not much affect the optics of the eyepiece. And never try to clean the bottom of the eyepiece; any dust particles there that are not already dislodged by the bulb need not be bothered with. It is also not necessary to clean an eyepiece all in one go. The cleaning can be done in stages, with use in between.

The renewed Plössl will see good use.
(Photo: Tom Cocchiaro)

Fingerprints on the lens can do real damage if left untreated, as they will start etching the coatings. But dust and similar debris can usually be blown and brushed away, without need for cleaning with a fluid.

In Summary

- Do not use pressurized air-blowers, and never touch the brush tips.
- While Acetone may be a more efficient cleaner, pure Isopropyl Alcohol is safer and does the job well. Avoid Rubbing Alcohol.
- Use only 1 or 2 drops of fluid per swipe, and never re-use a Q-tip.
- Always breathe on the lens before a swipe. The water film helps.
- Be very gentle! Almost roll the Q-tip over the coated surface.
- There is no need to get at every bit of debris at the edges of a lens.
- The cleaning can be done in stages. Intervening use of the EP may help with evaluation of your technique.

Below: The teacher and the students.
(Photo: Ted Blank)

Let's Turn Time Back:

The epic handover. No releases were signed.
(Photo: Tom Cocchiaro)

"Can I get in there, please? PLEASE??"
(Photo: Ted Blank)

Sunspots and CMEs

The month began with festivities of First night in the south, and ended with an exceptional skywatch in the north, at Bethlehem, NH. Turning time back from the end, we witnessed a Type Ia Supernova in the Cigar Galaxy (M82) and remembered the life of John Dobson. Journeying back one more week, there were the spectacular sunspots and coronal mass ejections (CMEs) of Sunspot Cycle 24, now in high gear.

The group that came to be known as ***AR1944,*** was imaged by a number of members in the cold of the first week of January. **Andy Jaffe** beat the wind chill outside and the cool-down time of his scope – he shot through the double pane window in the hallway with his Pronto, using a Thousand Oaks filter. **Joe Dechene** took a more conventional route to image with a white light filter. Using his TV-85 refractor (white light) and Coronado PST (H-alpha) during a lunch hour, **Paul Winalski** did his thing, and filed this observing report (edited):

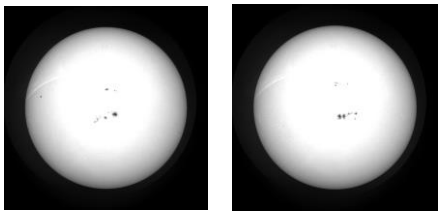
AR1944 on Jan. 7 (Images: Andy Jaffe and Joe Dechene)

Solar Active Region 1944 is the single largest sunspot, and sunspot group, of the current sunspot maximum. The full active region is enormous – two Jupiter diameters wide. It has one sunspot 4 Earth diameters wide, and another that is 2 Earth diameters, and then a whole crowd of smaller sunspots. I've also been following AR 1944 on the SOHO and SDO websites. There was a coronal mass ejection (CME) directed at the Earth (on Monday, January 6). The SOHO view, which is essentially our earth-bound view, showed a large amount of scintillation from the charged particles of an Earth-directed CME. This usually indicates the possibility of auroral displays in the very near future.

On January 7, at 1:30pm EST, John Bishop and I set up telescopes to observe AR 1944 in both white light and H-alpha. We also observed naked-eye using white light aperture filters. The view was spectacular in both wavelengths. In white light, this is by far the largest sunspot group of the current solar maximum. Two very large sunspots, and at least half a dozen smaller magnetic areas are visible. In H-alpha, some of the sunspots showed up as dark areas: highly unusual, in that only the biggest, fiercest sunspots ever show up that way. The rest of the active region showed up as the usual set of roiling semi-bright regions with "tiger stripes" representing jets of plasma curving around between the magnetic poles of the active region.

*But there was something exceptional still – a **very bright** arc of light in H-alpha between two magnetic poles of the active region. I have never seen anything like that in H-alpha before. I had only a guess as to what it might be. I visited the SDO and SOHO sites the next day to confirm it. It had been what I thought it was – an X-1.2 (maximum intensity) solar flare and the associated coronal mass ejection directed point-blank towards the Earth. The bright arc of light in H-alpha that we observed visually was the solar flare itself.*

By January 12, this cluster of sunspots (including AR1944) had rotated out of sight of earthbound observers. The rotational period of the equatorial region of the Sun is known to be about 25 days, and by month's end, another set of large spots did appear at about the same latitude. The most prominent of this group of sunspots (active regions really) was assigned the name AR1967.



AR1944 on Jan. 7 and AR1967 on Feb. 3 (Images courtesy: SDO/NASA)

You might already have guessed what this is leading up to...

Sunspot Nomenclature

There is no naming or numbering system for Sunspots. Only a system for numbering **Active Regions** exists, hence the AR prefix to a four digit number. An active region can contain one or more sunspots. Believe it or not, it is the National Oceanic and Atmospheric Administration (NOAA) that numbers active regions (consecutively) as they are observed on the Sun. An active region must be observed by two observatories before it is given a number, unless a flare is observed in it.

The present numbering system began on January 5, 1972, at zero. Active regions were numbered when observed on the side of the Sun facing Earth. Since the Sun rotates approximately once every 25 days at the equator and 34 days at the poles, the same active region could be seen more than once, if it lasted long enough. But the region is given a new number each time it appears on the Earth-facing side; assumptions could not be made. A long-lived active region may therefore have several identities in its lifetime.

On June 14, 2002, Active Region number 10,000 was reached. NOAA solved its equivalent of the Y2K problem by going back to square one, or zero. For practical (and non-computational) reasons, Active Region numbers continued with only four digits. Active Region number 11944, for example, was the AR1944 we saw in January 2014. Most likely, AR1967 is its next identity. There might even be another incarnation at the end of February, and another identity. Then there's the question of why an active region cannot be tracked all the way around the Sun.

The periodic change in the Sun's activity and appearance led to the formulation of the **Solar Cycle,** of between 9 and 14 years in duration, about 11 years on average. In the mid-19th century, sunspot activity records were analyzed and numbers plotted over time; the period of 1755-1766 became Cycle 1 (trough to trough). Cycle 24 began in January 2008. The previous cycle began in May 1996 and was noted for its more than 800 sunspot-free days. Its maximum was computed to be March 2000, but the largest solar flare ever measured with instruments occurred on November 4, 2003. It was not Earth-directed.

Solar Observing from Space

Three separate Solar observing platforms in outer space are covered in this section: **SDO, STEREO** and **SOHO**, launched respectively in 2010, 2006 and 1995. SDO and STEREO are operated by NASA, while SOHO is operated jointly by ESA and NASA.

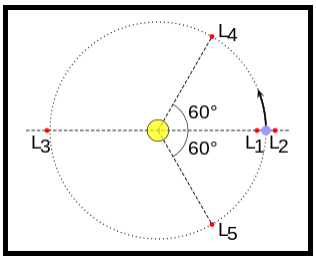
The ***Solar Dynamics Observatory*** (SDO) is stationed 22,240 miles up in a nearly circular, geosynchronous orbit around the Earth, above the 102°W longitude. It is investigating the Solar atmosphere and magnetic field, and their effects on solar wind, charged particles and the irradiance of the Sun. On July 19, 2012 it captured a medium-sized flare in a stunning sequence. Click on the icon alongside to play the 4+ minute video of the event.

(Image courtesy: SDO/NASA)

The ***Solar Terrestrial Relations Observatory*** (STEREO) consists of a pair of spacecraft in heliocentric orbit, that now permit stereoscopic imaging of the Sun and solar phenomena, such as CMEs.

One spacecraft **(STEREO-A)** is "ahead" of Earth as it orbits closer to the Sun; the other **(STEREO-B)** is "behind" in an orbit farther from the Sun than Earth's. Since STEREO-A orbits the Sun in about 346 days, the spacecraft/Sun/Earth angle increases by 21.65° each year. With STEREO-B, the situation is reversed – an orbital period of about 388 days means that the spacecraft/Sun/Earth angle 'increases' in the opposite direction each year by about 22° (or increases by -22°, take your pick!).

A gravitational slingshot by the Moon when initially in a highly eccentric Earth orbit enabled each craft to achieve its prescribed heliocentric orbit. Over time, the pair will continue to separate from each other at a combined rate of about 44° a year. The STEREO pair achieved quadrature, a full 90° separation, on January 24, 2009, and passed near the Sun-Earth's $\mathbf{L_4}$ and $\mathbf{L_5}$ Lagrangian points later that year. On February 6, 2011, they were 180° apart, allowing the entire Sun to be viewed at once for the first time.



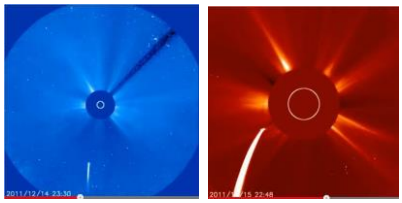
The Lagrangian Points (courtesy: Wikipedia)

Even as the angle increases, traditional near-Earth views from SDO and SOHO will help provide full-Sun access for a while, but in 2015 contact with STEREO will be lost for a time when both craft will be in conjunction with the Sun (of different types). By 2023, the process will have come full circle as they both approach Earth. There are no final positions for these spacecraft, only a current position.

The ***Solar and Heliospheric Observatory*** (SOHO) is in a halo orbit around the Sun-Earth $\mathbf{L_1}$ Lagrangian point. It cannot afford to be exactly at L_1 as this would make communication with Earth difficult due to radio interference generated by the Sun. Its 2-year mission plan has already lasted more than 18 years.

It is tasked mainly with investigation of the outer layers of the Sun, especially the corona, and carries a Large Angle and Spectrometric Coronagraph (LASCO), which studies the structure and evolution of the corona by creating an artificial solar eclipse. There are two screens – C2 is twice the apparent diameter of the Sun, and C3 thrice the diameter. SOHO's data are used to predict solar flares, so that Earth-based electrical grids and satellites in orbit can be protected from the damaging effects of solar flares.

A side benefit of creating an artificial solar eclipse on demand is the facility to monitor the path of Sun-grazing comets at perihelion. In mid-December 2011, a sun-grazer survived its loop around the Sun and SOHO was able to track the path of comet Lovejoy (C/2011 W3). Time-lapse images of that passage are available as short videos (click on the icons to play them). Note how the comet's tail is at first blown out by the solar wind, and how it re-forms after the comet has swung around the Sun.


LASCO C3 and C2 views of C/2011 W3 Comet Lovejoy (Images: SOHO/NASA)

Publicly available imagery of SOHO's LASCO instrument has been used in the past 15 years by amateurs around the world to search for and discover nearly half the known comets, about 2400 so far, at a rate of one every two and a half days. So if you have the time and the patience, have a go at it!

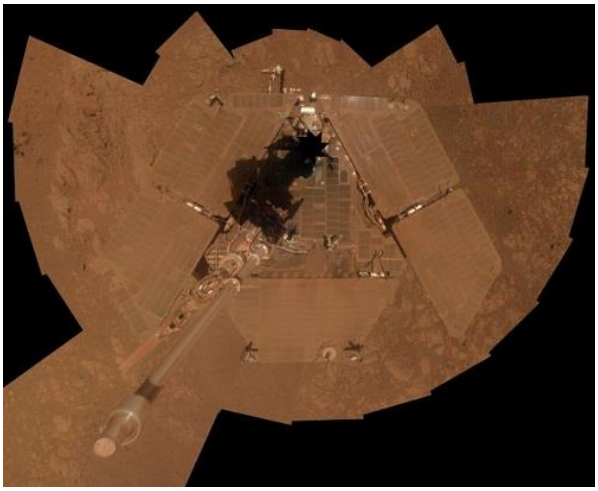
As the Sun Turns

We end much as we began, with an observing report on ***AR1967*** by **Paul Winalski**:

*Solar active region AR1967 is a **huge** sunspot group, with a couple of Jupiter diameters in extent and over ten sunspots, several of which are bigger in diameter than the Earth. This group is visible to naked-eye if you hold a telescope aperture filter before your eyes, and just look at the Sun through it. This active region has already kicked off a M6.6 solar flare. John Bishop and I were privileged enough to see this in progress through my Coronado PST H-alpha scope; the flare was even visible as a plage in my TeleVue 85mm refractor with white-light solar filter.*

- ***Ramaswamy***

Opportunity Knocks at 10



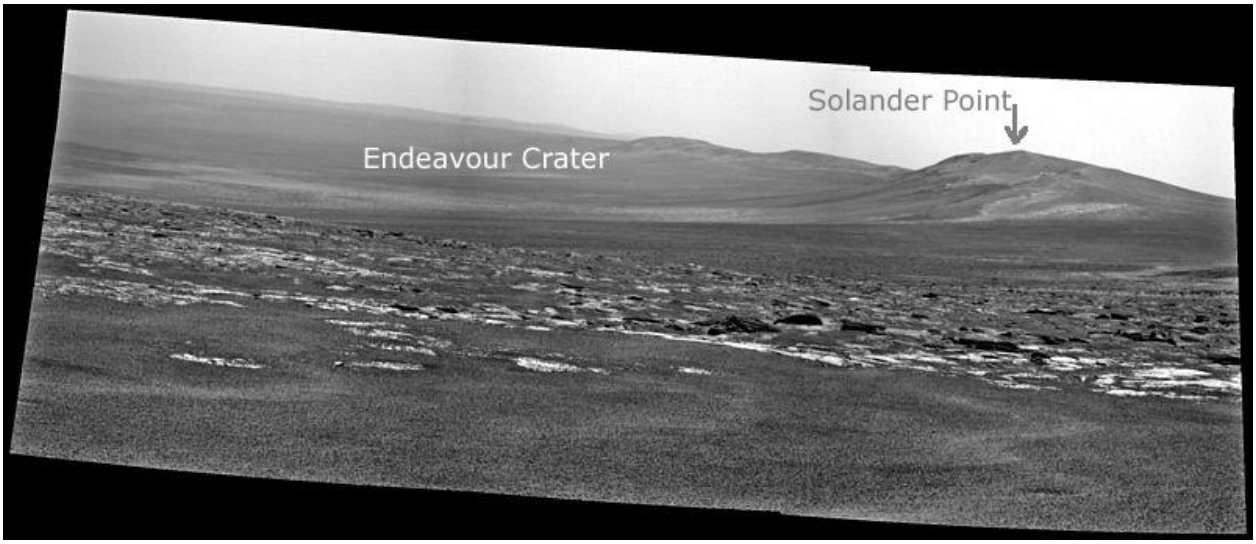
Opportunity's "selfie" *(Image: NASA/JPL)*

On July 7, 2003, NASA launched a rover spacecraft called MER-B on a 6½ month flight to the Red planet. It trailed its sister-craft MER-A by about 4 weeks. They were better known as *Opportunity* and *Spirit*.

After its safe arrival at Mars on January 25, 2004, *Opportunity* was expected to be operational for about 90 days, exploring the alien terrain. But against all odds, it was still working well on January 25, 2014. To celebrate its 10 years of exploration, *Opportunity* took a set of snapshots of itself on January 6th.

A robotic rover that was not expected to trek more than a kilometer before losing all power (with its solar panels completely covered by Martian dust), has now logged almost 39 kilometers of travel on Mars. Its longevity can be attributed to good genes (er, engineering), careful movements, the beneficial aspects of Martian dust devils and plain good luck.

In August 2008, having spent 11 months exploring in and around Victoria Crater in Meridiani Planum, *Opportunity* began a 3-year, 21-km circuitous journey to the bigger Endeavour Crater (22km in diameter, compared to Victoria's 750 meters), avoiding hazards en route to arrive at Spirit Point (at the western edge of the crater). For the last two years, it has been exploring Endeavour's rim and dealing with the Martian winter. At present, *Opportunity* is perched atop Solander Point, after a 2-month long 270-meter climb up to the lookout at the southern edge of the crater rim. And this is where in an image taken on January 8, 2014, a mystery rock (dubbed 'Pinnacle Island') showed up in front of the rover!



Opportunity looked across Endeavour Crater in 2011 ***(Image: NASA/JPL)***

Opportunity could now look *back* at the scenery above. It sends new pictures and data down to Earth daily, continuing to serve as a roving geology and meteorology laboratory on Mars.

- ***Ramaswamy*** *and* ***Ted Blank***

What if inches were bigger?

Why are amateur telescopes the sizes they are?

Telescopes come in a range of apertures and f-numbers, but only certain apertures and f-numbers are common. Several manufactures make solid-tube Newtonians in 6-inch and 8-inch apertures. 4.5-inch and 10-inch models are common as well. Although 5-inch and 7-inch Newtonians have been made commercially, they are rare. No one makes a 1-inch Newtonian or a 30-inch solid-tube Newtonian.

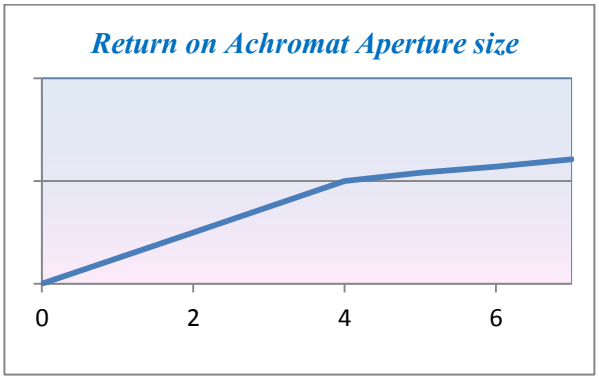
Among refractors, the 4-inch f/10 to f/15 achromat is another "standard" telescope, though these days it is mostly labeled as a 100mm. I see 70mm, 80mm and 90mm refractors for sale, but very few sizes in between (the TV 85 is an example of an in-between size).

Considering the 100-mm to 4-inch change, both are "round" numbers. I find myself wondering if these sizes were chosen because the numbers were satisfyingly round, or whether there was some real physical or anatomical reason for their use. In other words, I wonder whether, if our measurement system were a bit different -- if "inches" were a little bit bigger or smaller -- would a "4-inchette" f/12 still be the standard achromatic refractor? Or would the standard still be the same real size and have a different measurement value, like 8.23 inchettes? Are telescopes like shoes, which have a size set by real-world constraints, or are they like measuring cups, which have a size set by convention?

I think there's something real behind the standard sizes -- or rather, there are several real things behind them. Even if we had different measurement standards, Newtonian solid-tube telescopes would still be sold with about four choices ranging (in current units) from four to ten inches, and there would be a commonly-sold refractor with a four-inch aperture. In other words, telescopes are more like shoes.

The Constraints

There are a number of constraints that make certain sizes "sweet spots" for telescopes.



One such constraint is our atmosphere. In theory, the wider the aperture, the better the resolution. But the Earth's atmosphere is wiggly enough that most nights in most places don't allow resolution finer than one arc-second. Physics tells us that a telescope with a four-inch aperture can resolve 1 arc-second features. This means that when designing a telescope, for up to four inches of aperture, you get both more brightness and more resolution as aperture increases. Above four inches, you only get a brighter image; you don't get more resolution. This means that the optical payoff for a larger aperture is smaller above 4 inches than below it. Meanwhile the cost of increasing the aperture goes up with the aperture size (approximately by the cube for lenses and by the square for mirrors). When designers weigh costs against the benefits, a four-inch aperture looks like a good bet, a “sweet spot” in the design space.

The minimum payoff is a constraint as well. A one-inch achromat doesn't do much for you astronomically unless packaged in pairs as binoculars. If you won't get significant magnification and light-gathering, why get a telescope in the first place? The judgment of the market seems to be that 60mm is the minimum aperture to justify "being a telescope" at all, while 25mm seems to be the minimum for binoculars.

Another constraint is transport. Not just transport as in "does it fit in the car," but also as in "can I put it on the mount and take if off again."

Let us look at the constraints from the viewpoint of human anatomy. I'll start with the number of hands you have: two. For tripod- or pier-mounted telescopes, at one time during set-up you will have to lift your telescope onto the mounting head, hold it there with one hand and tighten a fastener with the other. If the telescope drops while it is unfastened, it will be damaged. Mounting a telescope is thus a high-stakes operation.

People want the telescopes they mount to be "wieldy" in one hand, to feel confident they won't drop their precious instrument in the act of mounting it. As humans, we have a number of things we manipulate with one hand, like tennis rackets, swords, fly swatters, fans and squirt guns. Many of them are a bit less than a meter long; few are longer. Other objects are manipulated with two hands, like quarterstaffs, brooms, hockey sticks, golf clubs and baseball bats. They seem to be between one and two meters in length.

Based on these examples of common practices, it looks like "wieldy" for one hand has an upper-size limit of around a meter, while "wieldy" for two hands is a bit less than two meters.

The Interaction of Length and Aperture

If you are designing an achromat, there's a rule of thumb for optical designers that chromatic error is not a problem for a telescope of aperture A in inches if the design's f-number is three times the number A. Thus a one-inch refractor can be an f/3, a two-inch can be f/6, but a three-inch should be f/9, and so on. You can work this in reverse as well: if you've decided to design an achromat which will be L inches long, the maximum aperture it can have without showing too much chromatic error is the square root of a third of L. A 300-inch long achromatic telescope could have a 10-inch lens (and would be an f/30).

In practice, the 'old guys' accepted the chromatic error in large scopes. Percival Lowell's big scope is a 24-inch f/16 and the biggest one at Yerkes is a 40-inch f/18.6. The old masters managed by a) "learning to see around the error" – which worked because the human mind is a powerful thing, and they weren't using film; and b) using an iris to stop down (narrow) the aperture when looking at bright objects, when aperture wasn't critical. Once stopped down from 40-inch to a 16-inch, the Yerkes telescope would essentially be free of chromatic error as an f/46.5.

So now we can figure out the natural sizes for achromatic refractors which aren't permanently mounted. If the requirement is to be "one-hand wieldy" and a bit less than a meter in length, the rule says the largest aperture would have to be 3.6 inches. That explains why the 90-mm achromat refractor is a standard size.

In summary, the resolution payoff for larger aperture is high until you get to four inches, at which point it flattens out. So the compromise between resolution and chromatic error is a 4-inch achromat with barely enough length to fit the rule: an f/9 or f/8. This would be 36 or 32 inches long, barely wieldy in one hand.

Apochromatic refractors can have smaller f-numbers for the same aperture and level of visible chromatic error. They are thus shorter than achromats of the same aperture. 5-inch APOs are sold, but when you

look at those on the market, it's clear that being "one-hand wieldy" influences the sizes for sale. There are bigger APOs which require two hands to hold and three hands to mount, but I suspect that the raw cost of the lens is the dominant consideration for designers of commercial APOs aimed at the amateur market.

Even the big APOs aren't heavy enough that the weight is a significant constraint, but that's an issue for other designs. Consider solid-tube Newtonians. If they're on a Dobsonian mount, they only have to be "two-hand wieldy"; you never have to lift them above the waist, let alone above the shoulder and you don't have to hold them in place with one hand while you do something else with the other: they drop into the rocker box and then stay there on their own. So solid-tube Newtonians can be quite heavy. But at around twelve inches of aperture, the mirror weight begins to be a burden and larger sizes quickly become impractical to sell because no one could lift the tube to put it on the base. The slope of that constraint curve is steep, because the weight of the mirror goes up as the cube of the aperture.

Another factor limits solid-tube Newtonians: they have to fit in your car. Most cars can fit a tube of about 50 inches in length and so the common apertures wind up mounted in a tube of that length. This explains why a typical line-up of Newtonians from a vendor includes a 6-inch f/8, an 8-inch f/6 and a 10-inch f/4.5; the tubes are all about 48 inches long.

Newtonians don't suffer from chromatic aberration but they have coma, which is worse at low f-numbers. Newtonians in amateur sizes below f/4 often have more coma than people can tolerate (though Televue's Paracorr has recently changed this and some boutique manufactures are offering "sub f/3" telescopes). Put these considerations together and it's not surprising that solid-tube Newtonians get made up to 12 inches but shorter lengths are more popular.

The truss-tube design lets Newtonians be bigger, but the weight constraint is still there and kicks in strongly above 16 inches in aperture – a typical 16-inch mirror box weighs about 80 pounds. That's pretty heavy, and more importantly, it is an awkward kind of weight. A mirror housing is a big box with the weight in the center so you can't carry it with the center of gravity close to your body. You can buy truss-tube Newtonians in larger sizes but they come with wheelbarrow handles and require ramps; above 20 inches they are "boutique" items, and are built to order rather than commercially made, so the concept of a "standard" doesn't really apply.

The "Standards"

Rather than going on to consider other telescope designs, let's return to the issue of which sizes are usually picked and whether those sizes are round numbers because of our measurement system or they are round numbers near sizes which would be picked no matter what measurement system we used. I think I've shown that there is a range of apertures which is "natural" for achromats (two-plus to four inches), for apochromats (three to six inches), for solid-tube Newtonians (four to twelve inches) and for truss-tube Newtonians (ten to sixteen inches).

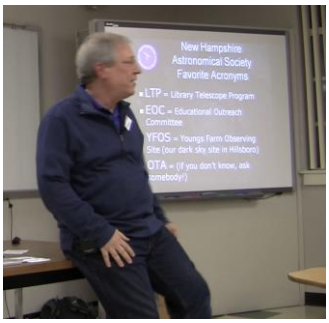
The issue of how a "natural" range of sizes is broken up into a few models for sale is interesting as well, but I'll leave that for another essay.

- ***John Bishop***

NHAS January 2014 Business Meeting Report

The monthly business meeting was held at St. Anselm College, Manchester on January 10th, with 29 members in attendance and our new President **Ted Blank** presiding. A Special Election to fill a vacancy on the Board of Directors was also held. The Treasurer's report by **"Rags"** follows on the next page.

President's Report



Ever the NASA man, **Ted Blank** began the evening with a list of NHAS acronyms. Key events of the previous month were listed, including the very successful in-reach skywatch and the pot-luck. A number of recent new members in the audience were recognized and asked to introduce themselves. The Top 3 News items of the past month, in reverse order were:

* 10 years of Opportunity on Mars
* Cassini's "wave at Saturn" image (a look back at Earth) released
* China landed their Chang-e3 rover on the Moon.

He pointed out some of the recent postings in the Pictures Forum and encouraged members to look in.

Membership Committee

Rich DeMidio, the Membership Committee chair, announced his vision for improving the NHAS membership experience and the goals for 2014.

Ken Charles and **April South** will be assisting Rich. Membership processing will be automated, a welcome package with hardcopy handouts of all club-related information will be available to new members, and a "push" model for training and mentoring will be implemented. Rich is also looking for input in this area from club members.

A Quarter by Quarter Roadmap for the year was announced:

Q1: Web conferencing - the key to the "push" model. Automation of membership registration and renewals, and inventory of materials we already have.
Q2: Pilot test web conferencing with existing courses and test automated membership registration processes.
Q3: Roll out automated membership processing, in time for October 2014 renewals. Offer facilities for remote and face-to-face sessions.
Q4: Offer regularly scheduled sessions.

A Special Announcement

"Although we are not sure if the State of New Hampshire recognizes same club marriages…" was the preamble to news that past President **Rich DeMidio**

and past Director **Jean Buckley** had tied the knot out-of-State in December (in Massachussetts). A celebratory cake was enjoyed by all at the break. We wish the happy couple clear skies!

(Photos: Ted Blank and Tom Cocchiaro)

2014 Director Election

Following Ted Blank's resignation from the Board, a by-election was held to fill the vacancy. Steve Rand was nominated and seconded. Once nominations were closed, and with just one candidate up for the office, election was by voice acclamation.

Steve Rand will serve for one year, the calendar year of 2014.

LTP 2013 Award

Pete Smith, LTP Chair, handed out awards at the December pot-luck. The award missed due to absence, was presented this time around to **Ramaswamy.**

The LTP "Grammy" Award.

The Evening Presentations

Ted Blank did a slide show with some very interesting comments about the artifacts he encountered on his visit to the newly renamed Galileo Museum, in Florence, Italy. More about this in the February edition of the **Observer.**

Gardner Gerry then conducted a clinic on cleaning eyepieces. ***Read all about it on page 14.***

NHAS Treasurer's Report

(as of January 8, 2013)

Starting Balance:		**$12,558.41**
Deposits:		
Membership	146.49	
Donations	955.85	
Interest	0.00	
Total:		**$1,102.34**
Expenses Paid:		
Total:		**$0.00**
Current Checking Balance:		**$13,660.75**
Petty Cash:		**$100.00**
Current Cash Balance:		**$13,760.75**
EOC Share:		**$7,676.64**

Membership	**116**	
Cash Renewals:	1x30.00	30.00
Cash New Members:	1x30.00	30.00
PayPal Renewals:	3x28.87	86.49
PayPal New Members:	0x28.87	0.00
Total:	**5**	**$146.49**
Current Members: 121		

New Member

Dan Roy	Manchester, NH

Donations

Rich Schueller	EOC	630.85
Randolph Public Library	EOC	325.00
Total:		**$955.85**

Contact Information

How to join NHAS

Write to us: **NHAS**
P. O. Box 5823
Manchester, NH 03108-5823

Send Email to: **info@nhastro.com**

Visit our web site: **http://www.nhastro.com**

How to contribute to the Observer

Email articles and snapshots to the Editor:

ramax.astro@yahoo.com

NHAS Officers:

President:	**Ted Blank**
Vice-President:	**Tom Cocchiaro**
Secretary:	**Paul Winalski**
Treasurer:	**David "Rags" Gilmore**

Board of Directors:

Ken Charles
Pete Smith
Steve Rand

Orion XT6 – 6" Newtonian on a Dobson mount

(custodian: Ted Blank contact: tedblank@gmail.com)

Equipped with:

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

Meade 8" Newtonian on a Dobson mount

(custodian: Ken Charles contact: starnek2550@gmail.com)

Equipped with:

- Telrad finder with a dew shield
- 25mm and 10mm EPs
- Custom-built base (a Joe Derek original)

Coulter Odyssey 10" Newtonian on a Dobson mount

(custodian: "Rags" Gilmore contact: 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 on loan, independent of the telescope, and in a separate slip-case:

- Sky Atlas 2000.0 by Wil Tirion and Roger Sinnott
- Sky Atlas 2000.0 Companion by Robert Strong and Roger Sinnott

Orion XT10 on a Dobson mount

(custodian: Pete Smith contact: psastro60@gmail.com)

Equipped with:

- Telrad finder (replacing the original finderscope)
- Assorted EPs: 35mm, 25mm wide-angle, 17mm and 10mm.
- An EP case will be available in the near future.

Regional Astronomy Clubs

New Hampshire Astronomical Society [NHAS] ***Skywatches around the State***
Sidewalk Astronomy in **Portsmouth**
www.nhastro.com

Amateur Astronomical Society of Rhode Island (North Scituate, RI)
www.theskyscrapers.org

Amateur Telescope Makers of Boston
(Westford, Mass.)
www.atmob.org

Astronomy Society of Northern New England (Kennebunk, Maine)
www.asnne.org

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

Northeast Kingdom Astronomy Foundation (Peacham, VT)
www.nkaf.org

North Shore Astronomy Club
(Groveland, Mass.)
www.nsaac.org

Penobscot Valley Star Gazers
(Bangor, Maine)
www.gazers.org

Online Live Observatories

Astronomy Live (broadcasts)
www.astronomylive.com

SLOOH (Tenerife, Canary Is.)
www.slooh.com/about.php

Worldwide Telescope
www.worldwidetelescope.org

Magazines

Astronomy
www.astronomy.com

Sky & Telescope
www.skyandtelescope.com

Sky at Night
www.skyatnightmagazine.com

Astronomy Gear

Agena AstroProducts
www.agenaastro.com

Astromart
(Used equipment and advice)
www.astromart.com

Astronomy-Shoppe
(in Plaistow, NH 03865)
www.astronomy-shoppe.com

Celestron
www.celestron.com

Cloudynights
(Used equipment, Articles, Forums and Reviews)
www.cloudynights.com

Explore Scientific
www.explorescientific.com

High Point Scientific
www.highpointscientific.com

Kendrick Astro Instruments
www.kendrickastro.com

Lunt Solar Systems
www.luntsolarsystems.com

Meade Instruments
www.meade.com

Oceanside Photo & Telescope
www.optcorp.com

Orion Telescopes
www.telescope.com

ScopeStuff
www.scopestuff.com

TeleVue
www.televue.com

Vixen Optics
www.vixenoptics.com

William Optics
www.williamoptics.com

Astronomy Web Sites

CalSky
(Sky Calendar to plan Observing)
www.calsky.com

Heavens Above
(on Satellites, Spacecraft, Planets)
www.heavens-above.com

NASA
www.nasa.gov

ScopeReviews
(Reviews by Ed Ting, **NHAS)**
www.scopereviews.com

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

SpaceWeather
(Solar activity, Asteroid passes)
www.spaceweather.com

Computer Software

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

Celestia
www.shatters.net/celestia

Computer Aided Astronomy (Free)
www.astrosurf.com/c2a/english/

Earth Sky Tonight
www.earthsky.org/tonight

SkyMap Online
www.skymaponline.net

Starry Night
(many versions, Novice to Expert)
www.starrynight.com

Stellarium (Free)
www.stellarium.org

WinStars (Free)
www.winstars.net/english/

Upcoming Events 27

Event	Date	Time	Location
Coffee House Night at YFOS	Saturday, February 1	5:00pm	YFOS
Rey Center Skywatch	Saturday, February 1	6:30pm	Waterville Valley NH
Parkside Middle School Skywatch	Wednesday, February 5	6:00pm	75 Parkside Ave, Manchester NH
Parkside Middle School Skywatch (backup date)	Thursday, February 6	6:00pm	75 Parkside Ave, Manchester NH
First Friday Skywatch for MSDC	Friday, February 7	7:00pm	MSDC, Concord NH
Sidewalk Astronomy Skywatch	Saturday, February 8	6:00pm	Market Square, Portsmouth NH
His Mansion Ministries Skywatch	Saturday, February 15	7:00pm	395 Wolf Hill Rd, Deering NH
Hampton Academy Middle School Skywatch	Wednesday, February 19	7:00pm	931 Ocean Blvd, Hampton NH
Hampton Academy Middle School Skywatch (backup date)	Thursday, February 20	7:00pm	931 Ocean Blvd, Hampton NH
NHAS Business Meeting	Friday, February 21	7:30pm	MSDC, Concord NH
Goffstown Public Library Skywatch	Wednesday, February 26	6:30pm	Water Precinct's Field (43.0250, -71.620), Goffstown NH
Coffee House Night at YFOS	Saturday, March 1	5:00pm	YFOS
Rey Center Skywatch	Saturday, March 1	7:00pm	Waterville Valley NH
First Friday Skywatch for MSDC	Friday, March 7	7:00pm	MSDC, Concord NH
Sidewalk Astronomy Skywatch	Saturday, March 8	6:00pm	Market Square, Portsmouth NH
Rindge Recreation Department Skywatch	Friday, March 14	6:30pm	(42.7346121,-71.9859983), Rindge NH
NHAS Business Meeting	Friday, March 14	7:30pm	MSDC, Concord NH

Note: ***Please check [Calendar] at www.nhastro.com for up-to-date information on upcoming events.***

Date	Lunar Phase
Thursday, February 6	First quarter 7:22pm
Friday, February 14	Full moon 11:53pm
Saturday, February 22	Last quarter 5:15pm
Saturday, March 1	New moon 8:00am
Saturday, March 8	First quarter 1:27pm
Sunday, March 16	Full moon 5:09pm
Monday, March 24	Last quarter 1:46am
Sunday, March 30	New moon 6:45pm

Credits

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

Bert Bingel, John Bishop, Tina and Ted Blank, John Buonomo, *Glenn Chaple*, *Dennis di Cicco*, Tom Cocchiaro, Maggie and Joe Dechene, Bonnie and Joe Derek, Gardner Gerry, "Rags" Gilmore, Joel Harris, Marion Hochuli, Andy Jaffe, Larry Lopez, Chase McNiss, Tiffany Nardino, Steve Rand, *Sidewalk Astronomers*, Pete Smith, *Mike Stebbins*, Ed Ting and Paul Winalski.