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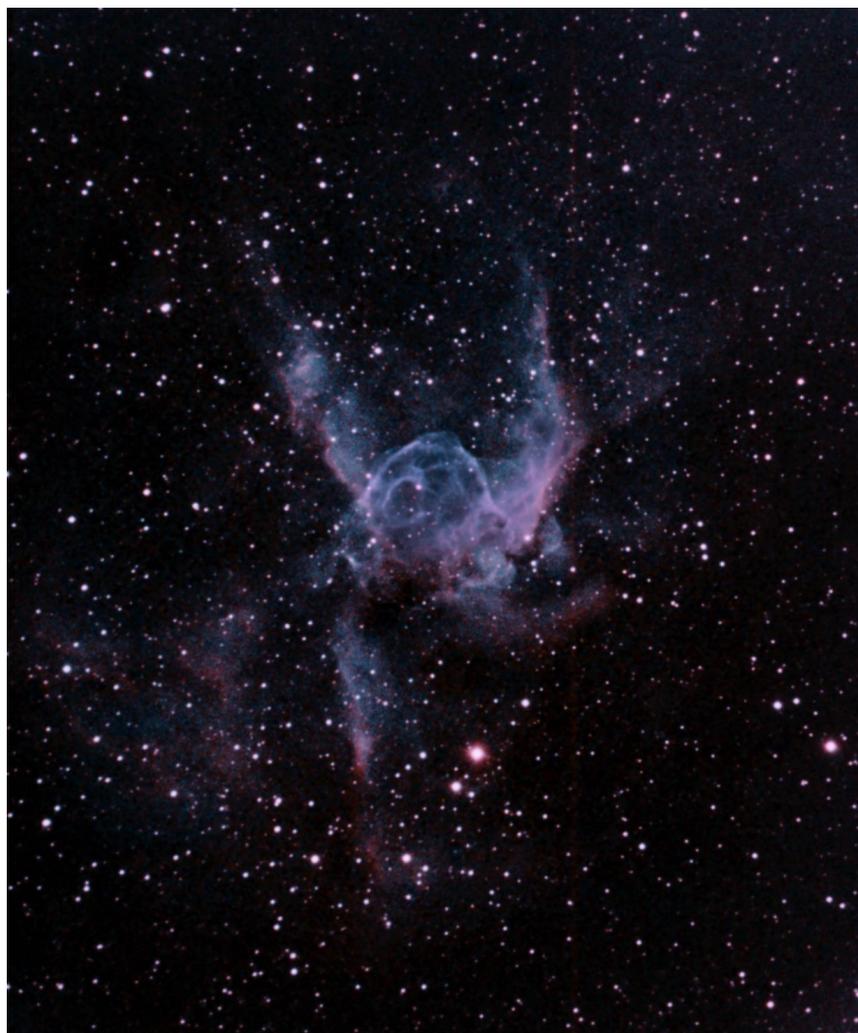
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## *Thor's Helmet*



NGC 2359, an emission nebula in the constellation of Canis Major, some 12 to 15 thousand light years distant and about 30 light years in size, imaged by **Herb Bubert**. The central star is a Wolf-Rayet star WR7, also known as HD 56925 and HIP 35378. Estimated at more than 10 times Solar mass, believed to be nearing the end of its life, it is radiating hundreds of thousands of times the energy of our Sun. While similar in nature to the central star of the [Bubble Nebula](#), interaction of its ultraviolet light with a nearby molecular cloud is thought to contribute to the complex shape of the helmet, the ionized gaseous material glowing in visible light. But two centuries ago, Sir John Herschel saw a bust rather than a helmet, while others see a head of another Canis!

[The technical details regarding the above image can be found on page 9.]

***The Past Is Now***

We know that light has a finite speed, but we don't use that knowledge much. The fact that the Sun is eight light-minutes away has no practical result and neither does the two-plus million light-year distance of M31. But I find it a fascinating idea that the Andromeda Galaxy I see is the one from the distant past and I can still remember the thrill of seeing the quasar 3C-273 at YFOS and knowing the light entering my eye had left the quasar when my ancestors were still bacteria.

While I think this is wonderful, I know that some of the people who come to our skywatches believe in a very young Universe. So when I talk about distances, I don't want to say how far back in time we're looking because that might cause them to cease to be happy to see the beautiful sky. Instead, I follow a suggestion of **Paul Winalski's** and say "If I had a super laser and pointed it at that galaxy, they wouldn't see it until two million years had gone by!"

Our telescopes are time-machines. As we look away, we look back in time, and as we explain, we look forward into the future!

**John Bishop**  
NHAS President

***Sky Watch Review******Hudson Memorial School,  
Hudson NH, March 11***

This was host teacher **Adam Goldstein's** first skywatch and he was trying it out on his 6th grade class. There were about 40 in attendance for the presentation, with the promise of a clear sky. I brought the club meteorite to show as part of the presentation and it was a big hit. **Paul Winalski** and **Gardner Gerry** had their scopes set up to show Venus, Jupiter, M42, the Pleiades, the Double Cluster, a few carbon stars, the multiple star Castor, as well as globular clusters M79 and M3, even with one problematic building spotlight. Paul was able to pull in a nice view of comet Lovejoy as well. Adam considered the event successful enough to include the entire school next year.

- **Steve Rand**

***Goffstown High School,  
Goffstown NH, March 17***

About 15 students and their teacher (**Mike Veilleux**) showed up. Skies were clear but there were very high winds and it was very cold. Other NHAS members present were "**Rags**" **Gilmore**, **Steve Rand**, and **Gardner Gerry**.

It was too windy to set up the 14" TScope, so I set up the TeleVue 85mm refractor and showed views of Venus, Jupiter, Comet Lovejoy, the Pleiades and Praesepe (M44). No aurora was visible – the school is to the north of the parking lot where we were observing, and floodlights on the school washed out the northern horizon. We did see two Iridium satellites pass through Leo in tandem, one of them flaring to mag 0.

- **Paul Winalski**

It was a cold and windy night, so the emphasis was on wind chill. Steve Rand was already there when I arrived, and two hardy youths with a barbecue grill of all things. The grill was fired up and we all had hot dogs, cheeseburgers, and spicy sausage as it moved into dark. *That* was spiffy. I showed Venus first, high, bright and gibbous, followed by Jupiter with all four Galilean moons laid out in a row, two on either side.

Despite the wind the seeing was not really that bad; at 60x I saw no telltale underwater effect, but the wind! Even at that modest magnification the image jumped and bucked like a mad hornet most of the time as the wind whipped around us and buffeted the telescope. Both Steve and I showed them the Great Orion Nebula, encouraging people to look through both scopes to see how the two views differed, Steve having a Newtonian and I a refractor.

Auriga was high in the sky so I showed M36 and M37 next. Then the wind

subsided and I swung back to Jupiter to get some steady views. Gardner had M65 and M66 in his telescope; they were so faint (being just above the light pollution from Manchester) that I'm not sure I'd have seen them if he hadn't pointed out where they were. Paul showed everyone Comet Lovejoy in Cassiopeia and I ended the night failing to find M81 and M82 in both my telescope and Steve's. Every year one target seems to elude me, and this year it seems to be that pair.

- "Rags"

### *Salem High School, Salem NH, March 18*

Due to thaw-freeze cycles in the previous days we had to carry our gear over a flooded sidewalk covered with bits and pieces of wood. The wood looked like it had been theater props, painted in odd shapes. Other NHAS members in attendance were **Gary Duranko** (who handled the presentation) and **Gardner Gerry**. **Ed Burke** of GAAC was also present. We had a good number of students and showed Jupiter and Venus. Skies were not clear, nor were they dark,

so only the brightest deep-sky objects were worth showing (e.g. M35, M42).

- **John Bishop**

### *Daniel Webster College, Nashua NH, March 23*

**Steve Rand** gave the indoor presentation (and took the photo below) while **John Bishop, Gardner Gerry, Larry LaForge**, and **Paul Winalski** set up telescopes. Because of the snow we couldn't reach the back parts of the athletic fields, but there was a cleared area at the entrance to the fields that was decently shielded from artificial lighting. We couldn't drive up to that site, so I used the TeleVue 85mm refractor instead of the 14" TScope.

There was a very fine crescent moon with a couple of mountain peaks reflecting sunlight from just beyond the terminator, something I had never seen before. Later that night the 15 or so students got to see one of Jupiter's moons emerge from eclipse and a mag -1 Iridium flare within half a degree of Jupiter. I also got excellent views of the Pleiades, M44, and the whole of Orion's sword – low-power, wide-field refractors do have their uses.

- **Paul Winalski**

I had my 6.5-inch reflector which was a bit of a carry, but it meant I could show a lot of detail on Jupiter and the Moon. When all the visitors had seen those, I showed M41 and M42. I failed to find the Leo triplet of galaxies and failed on M51 -- the skies just weren't dark enough and seeing was only fair. Despite that, the students were pleased and surprised and happy they had come, so that's good!

- **John Bishop**

### *Josiah Carpenter Library, Pittsfield NH, March 24*

This is not a conventional sky watch – only a presentation and demonstration of their library telescope. There were about 15 patrons present, including a good number of Cub Scouts and their parents. In addition to the usual "what's up in tonight's sky" I discussed distance measures in space (what is a light year) and types of telescopes. I demonstrated all of the features of the library telescope. I did realign the red dot finder and showed the librarians Venus, Jupiter and the Moon.

- **Paul Winalski**



*Larry LaForge and DWC students, with a CG4 trying to get in the way.*

*[The skywatch for Milton Free Public Library as part of the Milton Town Winter Carnival, first scheduled for February 14 and postponed to March 7 due the cold, had to be cancelled due to overcast conditions. But a very curious 'cancellation' also occurred on March 8 when the skywatch for the third graders of Thorntons Ferry School on April 15 had to be withdrawn because the starting time of 7:45pm EDT was too late for the youngsters. Sunset on April 15 will be at 7:20pm. Oh, the joys of Daylight Savings Time! -Ed.]*

## *YFOS Orientation Day, February 27*

Friday February 27 marked the first YFOS orientation of 2015. The CSC showed no clouds, excellent transparency, and unknown seeing conditions, though the Moon was waxing past first quarter. The forecast was for single-digit temperature by 9pm, but three hardy new members still answered the call. In the end we had no clouds, pretty good (but not quite excellent) transparency and decent seeing.

I showed up about 5:40pm and **Stan** was not only there waiting but had shoveled the way to the warming hut. While we chatted I shoveled the way to the observatory. Overall the site was well plowed; the warming hut had a chunk of ice at the bottom of the stairs and the observatory had a large mound of ice along the drip line from the roof. None of us having ice chipping tools, we could do little about that.

By 6:05 **Dave Long** and **Sergio Alvarez** had joined us. So we did the orientation, starting with powering the site, opening the warming hut, logging our use, starting the stoves, and readying the observatory. About the time the orientation was completely finished, **Dennis Isbell** showed up, so I left the other three and did an orientation for him. We didn't actually ready the observatory; the consensus was we didn't know how well the supports for the roll-off roof would take the weight of the considerable snow it was bearing, and discretion was the better part of valor.

One of the heaters in the warming hut wasn't working correctly (the larger one). The pilot lit just fine (though it did take a lot of pushing the piezo lighter) but it wouldn't generate heat. Dave managed to finagle it into operation but I didn't catch the details of what was done. My recollection is it involved the thermostat, so if the dark beige heater won't come on my guess would be that the thermostat isn't "calling" correctly so let the heater know to kick on.

I had set up my little 4" nameless telescope, which I brought intending to learn some Lunar features for a change, which we did for a few minutes. Then **Tom Cocchiaro** (of all people) arrived and said *Comet Lovejoy* was in Cassiopeia. I had a hard time finding that, so Tom set up his 6" refractor but by the time he was ready I'd found it.

Still and all it did look better with his fast 'scope and Ethos EP than my own telescope.

We also looked at Mars, Jupiter, the Great Orion Nebula, the Double Cluster, and some random cluster in the vicinity of Cassiopeia I didn't attempt to identify.

While we were at it Dennis took photos of Lovejoy with his new camera, a zoom lens and a tripod and it turned out amazingly well for a simple non-tracking arrangement, manual focus, and a remote shutter for manual exposure timing. There was very little streaking on the stars and a nice green coma with a definite tail.



*C/2014 Q2: Canon 6D on a tripod, 165mm zoom ISO 25600 f/5.6, 5.8 second exposure. (Image: Dennis Isbell)*

By 8:45 only Tom, Dennis and I remained and we decided to pack it in. Sadly the warming hut door would not close; Tom postulated that the weight of the snow on the roof had wrecked the entire structure, and I agreed. We finally managed to man-handle it shut, only to find the door wouldn't lock because the bolt was no longer aligned with the strike plate. Fortunately Dennis had a Phillips screwdriver and we took the strike plate off, which allowed the bolt home to leave the site properly secured.

When we left, the car said it was 5°F but that rapidly dropped to -1° by the time I was moving. Make of that what you will, but it was cold enough that even I'd have to say it was cold, and I started the night without hat or gloves and the front of my suit partly unzipped because I was so warm. It was a night worthy of Freeze Your Buns of yore.

- “Rags”

### Portsmouth Sidewalk Astronomy, February 28

Members **Tom Cocchiaro** and **Gardner Gerry**, as well as **Mike Deneen** of GAAC braved the cold in Market Square to show off Jupiter and the Moon to the Saturday evening crowds. Tom showed Jupiter with the Great Red Spot passing through the middle of the disk and I showed the Sinus Iridium area of the Moon which was just before lunar sunrise and presented a view of the mountains lit by sunlight with the floor of the Bay in the shadow. It was a spectacular view that made me wish I had brought along my laptop and planet camera.

We had the usual few hundred or so patrons stop for these views – lots of families with kids and even a girls’ hockey team fresh from a tournament.

- **Gardner Gerry**



*At Home on the Sidewalk, Astronomy-wise. (Photo: Gardner Gerry)*

*[The Sidewalk Astronomy event scheduled for March 28 was cancelled due to weather conditions. –Ed.]*

### Spring Messier Marathon, New Boston, Saturday March 21

*[I had expected to be at a place 78.2°N and missing this year’s Spring MM, but it was not to be. Instead I was in self-imposed quarantine at home 42.75°N and missing this year’s Spring MM. But fear not, other members of the club have supplied all the details and photographs of this year edition, held on its backup date. –Ed.]*

#### **Our Host, Larry Lopez, takes the lead:**

*Against all odds, things worked out quite well.*

*The first thing to mention is that Linda did most of the observing field snow removal, occasionally using an ax in preference to a snow blower. We had enough parking, the observing field was reasonable, and no one got stuck. The only problem was that it took so long for the skies to clear that people were tired.*

*Who attended? In great alphabetical disorder: Steve and Quinten Forbes, Stu May, Gardner Gerry, Ed Ting, Mike Townsend, Tom Cocchiaro, Larry LaForge, Rich DeMidio, Rob and Brian Mack, “Rags” (David Gilmore), Joe Derek, Andy Jaffe, Herb Bubert, Larry and Linda Lopez, Nick and Deanna Brodich, Ramaswamy (in absentia) and Boo Trey (dog at large).*



*The first and essential ritual: The Punting of the Jerky. Rich DeMidio hands off to Larry. (Photo: Larry Lopez)*

Steve Forbes's chili, at both pre- and post-criticality, was superb. Nick Brodich's pulled port was wonderful. And Linda's chicken soup was excellent, even on the next day, though Rich's beef jerky was almost gone by then. Sob.

There was enough food!!! The parking space was ok.

Ed Ting, on finding the observatory open, proceeded to show some people the insides. Not to be outdone I opened it up and started imaging furiously. You know I can image faster without automation!!! It's a fact. Probably has something to do with the JT65.



**(Above):** Linda Lopez, who made it all happen, and Gardner Gerry, who enjoyed the proceedings as only he can. The plowed observing field (below left), populated with some scopes under wraps. (All Photos on this page: Larry Lopez)



### **Gardner Gerry being his cool casual self:**

We had clouds in the afternoon which cleared up briefly and clouded up again. We all went back in to enjoy the pot luck and eventually began observing around 8-8:30pm. I used my TV-101 on an alt-az mount with the 31mm Nagler (17x and 4.5° FOV, so who needs a finder scope?) and found 26 of the Messier Catalog objects. [26 usually goes with a marathon, doesn't it? –Ed.] This was probably my most casual marathon – I didn't use charts and hopped around finding objects in no clear order and spent time with hanging out with my friends. A very enjoyable evening!

### **Tom Cocchiaro chimes in with his similar take:**

Although we only had about a two-hour window to observe, when the clouds cleared out it was "really" clear. Unlike Gardner, I used my 6-inch Astro Telescopes refractor outfitted with both a red dot finder (to get me close) and a Stellarview 7 x 50 finder to get even closer before looking in the eyepiece (13mm Nagler) which brought the setup to 70x. Like Gardner I logged 26 objects, but used my iPad loaded with SkySafari to search out groups of objects in the same area of the sky. It made it really easy to identify those objects I didn't have much experience with – the object pictures in the screen made it clear whether or not you were seeing the right target.



*(Above): Rich is out of his box as Stu, John, Gardner and Mike congregate outside, while inside Larry shows and tells, with only Herb paying attention. (Below): Clockwise from left in the foreground, Brian, Tom, the other Larry, Rags and Herb are polishing off the pot-luck, while (right) Joe and Andy are in the food-for-thought frame of mind. (All photos: Rob Mack)*



### **Rob and Brian Mack file their report:**

*Brian and I teamed up using binoculars for bright objects and the AT-111 equipped with 17.3mm Delos and a Telrad for the rest. We got to use my 'new' Pennington's MM book (which, incidentally, arrived via UPS on the Monday after the Fall MM at the Wicketts). What an amazing book... thank you, whoever it was, that brought it in at a Business Meeting last summer for a show and tell! It only took a moment to find objects I haven't looked at in decades. We just went from page to page and picked 'em off, mostly in the AT-111 with the help of the Telrad. The low-power views in the AT-111 were pretty nice and offered a fresh perspective on objects we've grown accustomed to seeing over and over again in the 12-inch. We identified 48 objects in the three hours or so before it clouded over again and the cold wind picked up. Sadly, we were halfway through the Messier objects in the Virgo cluster when the serious clouds returned, abruptly ending what was a really easy tally moment. A terrific evening! The fellowship was great and the food was incredible!*

### **Rob's take on the chameleon known as New England weather:**

*The evening started off cloudy, but with the Clear Sky Chart promising better skies after 10 PM. This afforded the MM faithful some time to set up scopes outside, and then feast on the bounty of fine food arrayed inside. At the appointed time, it came to pass as was foretold; the great sea of clouds parted and the Frozen Chosen entered the Promised Land of Dark Skies! About a dozen scopes were set up in the front yard ranging in size from 80mm refractors to an 18-inch dob. In traditional New England fashion, observing weather was ever-changing and fast-paced. From dusk until about 1 AM there was a combination of: complete overcast and mild temps; sucker holes and a breeze out of the northwest, snow flurries and broken overcast; and blazingly clear skies with bone-chilling gusty winds. Fortunately, the hot food and great fellowship inside the house was seemingly endless.*

### And “Rags” reviews his MM technology:

*I arrived at about 6:15 and it looked like it might sprinkle, so I set up everything but the OTA, hiding that and the EP case under the table for protection. Inside the fairly full house, over a dozen peeps were chatting and eating and having a good time waiting for the sun to go down and the clouds to clear off, with Larry running around snapping pictures of everyone there. More trickled in all the time and at 9:37 John Rose came in and announced it was in fact clear. So we all trooped out to get the MM underway.*

*This is the first time I've used an observing list on my tablet; Sky Safari (SS hereafter) allows one to use another's observing list, so I was using Ken Charles' MM Ordered list that he uses for marathons. That made the MM *very* much smoother! SS will put a little ring around each item in the current observing list, so even though we started late it was dead simple to look where the constellations were and see exactly what MM objects were still available to be bagged, and then simply pick up the list from that point. One may zoom in, zoom out, and fiddle around with the presentation to make the star hop to the current object as easy as possible. The observing list also lets one mark the item observed and conveniently adds the time and date as well, and a little check mark appears in the main list to indicate what has been seen and what hasn't.*

*There are three downsides: First, most tablets don't get overly dim, so even with night mode on it was considerably brighter than I would prefer. Secondly, night mode on SS does *not* apply to the on-screen keyboard, so it was impossible to take notes on the observation without getting completely blinded. Lastly, one must edit an observing list item in order to mark it observed, rather than simply do it from the main list. Even with these caveats, I thought it was an excellent tool for doing the MM.*

*Using SS in conjunction with the astronomical binoculars and the telescope, I whizzed through a personal best of 40 Messier objects in about two hours. The binoculars in particular are a killer with open clusters - look at SS, look sort of at that patch of sky, put the binoculars to the eyes, sweep around for a few seconds. *\*POOF\**. An open cluster right there. It's so simple it felt like cheating. Finding stuff in the telescope was considerably slower. (grin)*

*After those two hours the clouds rolled in big time, pretty much occluding everything, which was sad. At that point a number of peeps, myself included, decided to pack it in, it being pretty much midnight. Had we looked at the Clear Sky Chart we would have seen the clouds were transient, but alas we did not, so those of us who packed up and went inside for a final chat came back out about 12:30am to skies once again clear but a bit hazier.*

*I call it an excellent Messier Marathon. Many thanks to Larry and Linda for again hosting this seminal event.*



**(Above):** Nick and Deanna Brodich at their inaugural NHAS MM. (Photo: Larry Lopez)

**Ed Ting imaged the nebulosity of a newly discovered object, to be cataloged as M111 (far left), and then gave the traditional mission accomplished signal. (Photo: Rob Mack)**

## NGC 3115 – Lenticular (S0) Galaxy in Sextans

by Glenn Chaple

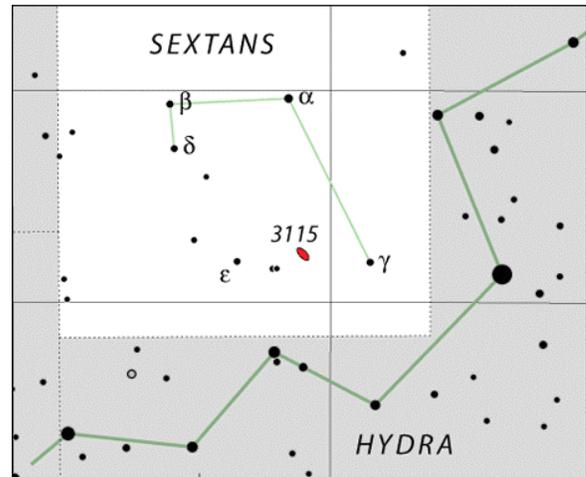
Some of the finest deep-sky objects are bypassed because they lie in star-poor regions of the sky. Such was the case with our February “Object of the Month,” the planetary nebula NGC 1501 in Camelopardalis. It’s also the situation with NGC 3115 – a bright “shoulda-been-found-by-Messier” object in that it eluded the French comet hunter’s eye and therefore his catalog. It was eventually discovered by William Herschel while surveying the obscure constellation Sextans in 1787.

At 9<sup>th</sup> magnitude, NGC 3115 is the brightest example of an S0 galaxy, one that bridges the galactic gap between the ellipticals and spirals. Its 8’ by 3’ dimensions (about half that, visually) have earned it the nickname “Spindle Galaxy” (a moniker it shares with the galaxy NGC 5866). It is also known as C 53, entry number 53 in the late Sir Patrick Moore’s Caldwell Catalog.

NGC 3115 is found at J2000 coordinates of 10<sup>h</sup> 05.2<sup>m</sup> (R.A.) -7° 43’ (Dec.). Star-hoppers need to begin outside Sextans with Alphard (alpha Hydrae). A line traced from this 2<sup>nd</sup> mag. star through 5<sup>th</sup> mag. gamma Sextantis and extended about half again as much (3°) will bring you to the vicinity of NGC 3115. A low power search should sweep it up.

From dark-sky sites, NGC 3115 can be glimpsed with binoculars. I had no trouble picking it up in a 3-inch reflector at 30X, noting that it appeared “as a very oval, compact nebulosity surrounded by fainter nebulosity.” Except for sharply pointed ends and a stellar nucleus, NGC 3115 remains relatively featureless when viewed with medium to large-aperture scopes.

A fuzzy, elongated blob isn’t exactly something you’d want to show visitors at a public star party. Don’t let this nondescript appearance fool you. In 1992, astronomers discovered a beast lurking at the core of NGC 3115 - a monstrous black hole with the mass of **2 billion** suns!



Generated by [www.constellation-guide.com](http://www.constellation-guide.com)  
(Courtesy: IAU and Sky & Telescope)



(Courtesy: [www.eyes4skies.de](http://www.eyes4skies.de))

## Herb Bubert's notes on his Thor's Helmet

*I spent a night up at YFOS in March 2011 shooting Ha & OIII frames to get this image. I had my C9.25 with the Celestron f/6.3 reducer and my SBIG ST-8300m camera mounted on the club's Titan. I shot a dozen 5 minute Ha frames (so it's an hour of Ha) and eighteen 5 minute OIII frames (for 1.5 hours of OIII). So it is a bicolor narrow-band image. I used Ha for the red channel, OIII for the blue channel and created a synthetic green channel by blending 20% Ha with 80% OIII to get a color image (Ha synG, OIII = RGB). From the filenames I deduce that I processed the image using Images Plus and probably did some additional processing in Photoshop.*

### *The Ones That Got Away... and Got Better!*



*Many visitors to Longyearbyen and some of its residents take in the 2½ minute spectacle as the total solar eclipse of March 20 hangs low over the high hills that hug the town from the south. Fortunately the polar bears of Svalbard did not have advance notice. (Credit: Tunç Tezel)*

It was not only a Vernal Equinox eclipse, it was a Super Moon eclipse. That's right – a Super New Moon that no one notices was only about 225,000 miles away.

But the track of the Moon's shadow on March 20 was across the vast North Atlantic, making landfall only at the **Faroe Islands** and **Svalbard** (also known as Spitsbergen).

I had planned to spend the week of March 16-23 in Longyearbyen, Svalbard, but it was not to be. A week-long bout of nasty flu did me in. And one more celestial happening got away.



*A Diamond on the way to Totality (Credit: Tunç Tezel)*

But **Tunç Tezel** of [TWAN \(The World At Night\)](#) was there and his permission to use images on this page is most appreciated. Skies over Longyearbyen were fairly overcast on the days (and nights) leading up to the 20th, but quite clear when it mattered most. In his own words:

*I observed the eclipse in perfect skies over Svalbard at 78° north. The only issue was the cold temperature, as low as -19°C in daytime and lower around totality; it was challenging for the equipment too. Apart from Venus, which became nicely visible about 10 minutes before totality, I did not spot any other celestial object. Also no aurora was visible at totality and I suspect not many people looked for it during the precious 2 minutes and 25 seconds of totality! The corona was one of the best I can remember since my first total eclipse in 1999.*

Tunç is an amateur astronomer and night sky photographer living in Turkey. In 2006 he completed the first ever [Analemma photograph that included a total Solar eclipse](#) (visible from Turkey on March 29 that year), a *tutulemma* that brought worldwide acclaim and publication of his photographs. One of his pictures, *Galactic Paradise*, won in the Earth and Space category in the [Astronomy Photographer of the Year 2011 contest](#) held by the **Royal Museums**, Greenwich, England. Other images can be found at the [TWAN Gallery](#) and at [APOD \(as recently as February 20\)](#).

***And that Was the Week that Was***

While hardy souls were taking in the total eclipse at 78°N (Svalbard) and 62°N (Faroe Islands), the ever enterprising **Thierry Legault** was imaging from southern Spain. He caught a transit of the International Space Station across the partially occulted Sun, giving us the iconic image of [APOD of March 22](#), curiously captioned as a double eclipse!

Just 3 days earlier, a major geomagnetic storm lit up the polar skies on St. Patrick’s Day (March 17) with a G-4 class event (kp=8 that briefly became kp=9, [the apex of that scale](#)). Sheets of Irish Green and more cascaded down, but Svalbard was overcast that night. However, some 10° to the south and 5° to the east, the skies over **Kiruna, Sweden** put on quite a show and for the first time in her life **Mia Stålnacke** saw blue aurora. She relives the moment:

*As everybody knows, green is the most common color in aurora displays, but up here we typically see purple almost as often as green, usually as a thin lining at the edges of the green bands. The green light is due to charged particles encountering oxygen at low altitudes (up to 150 miles), whereas oxygen at higher altitudes produces red light. The rare blue color is due to nitrogen at low altitudes (up to 60 miles) while nitrogen at higher altitudes produces purple light. I actually thought there was something wrong with my camera when I first started shooting that night. When I saw the LCD screen light up in blue, I tried adjusting the white balance but when it kept showing up as bright blue, I was ecstatic! To the naked eye it looked white, which is very odd for an aurora sighting up here. I just thought it was a super dim green aurora since it was at the beginning of the night but no, there it was, the amazing blue light! Only 15 minutes later the sky was on fire and that's when this photograph was taken.*



*A Flag over Kiruna at 8:53pm CET on March 17, 2015. (Credit: Mia Stålnacke, [APOD of March 30, 2015](#)) The brightest ‘star’ in the image is Jupiter, with Leo magnificently erect in the center – Regulus is almost lost in the brightest patch of green to be seen. Diagonally and to the right of Jupiter is M44, the Beehive, with Gemini in the top right corner. The handle and most of the pan of the Big Dipper is near the top left corner – Dubhe is missing, but Mizar and Alcor are resolved. [An 8-second exposure using Nikon D800 with 14-24mm f/2.8 lens at 14mm (ISO 1000). Post-processing done with Lightroom.]*

- [Ramaswamy](#)

## *Charles Messier, the Man and the Marathon*

Charles Messier's catalog represents a sampling of objects that can be viewed with a telescope in the night sky. In that spirit I hope to provide a brief sampling of his life, his accomplishments, his catalog and the marathon that bears his name. For most, your interest in astronomy may have been sparked by an event witnessed or followed, like the Apollo Moon landings, Comet West, the Voyager missions, or perhaps comet Hale-Bopp. For Messier, at the age of 13, it was the Great Comet of 1744.



*Comet Klinkenberg-Chéseaux, better known as The Great Comet of 1744, as seen before sunrise. (Credit: Wikimedia Commons)*

### *The Comet Hunter*

Messier was born in the Lorraine region of southern France on June 26, 1730. The sight of a magnificent 6-tailed comet in 1744 proved a transformative experience for the young Messier. His interest likely was further stimulated by the annular solar eclipse of July 25, 1748, visible as a partial eclipse from his hometown of Badonviller.

At the age of 21 he moved to Paris, obtaining a copyist position in the office of the Astronomer to the Navy, Joseph-Nicolas Delisle. During his first few years Delisle's assistant Libour introduced Messier to the observatory, its instruments and the process of record keeping. By 1754 Messier had advanced to the position of Depot Clerk.

In 1705 Edmond Halley predicted a 1758 return of a periodic comet that now bears his name. Although Halley did not live to see his prediction come true, by 1757 many astronomers of the time had calculated an orbit and begun their searches. Among these was Charles Messier (under Delisle's direction). Although he was one of the first to independently spot its return, mistakes in Delisle's orbital calculations resulted in Messier finally spotting it in late January 1758, almost a month after the first credited sighting. Internal politics also led to the January observation results being withheld from publication for over two months. These factors probably drove him to begin his independent searches for comets.

The next year he was credited with his first discovery, Comet 1759 II Messier, followed by the co-discovery of Comet 1759 III, better known as the Great Comet of 1760. Messier made additional comet discoveries in both 1763 and 1764. It was in 1764 that Messier discovered his third nebula, prompting his systematic search of both the sky and existing catalogs to identify nebulae to be avoided.

While continuing his searches, Messier also discovered the Great Comet of 1769 (1769 Messier) that earned him membership in the Berlin Academy of Science, thanks to the sponsorship by the King of Prussia. This was followed by the discovery of Comet Lexell in 1770, just a few weeks prior to his election to the Paris Académie Royale des Sciences. In January 1771, Messier was credited as a co-discoverer of the Great Comet of 1771. A month later he presented the first version of his Catalog of Nebulae and Clusters of Stars to the Paris Académie Royale des Sciences.

By 1773 Messier had been credited with eight comet discoveries – seven of them bearing his name and one named for the calculator of its orbit (Lexell) – and five co discoveries. In 1774 Messier was appointed Astronomer to the Navy. The same year Pierre Méchain had obtained a permanent post as a calculator with the Depot of the Navy, in a separate department within the institution. Apparently, the two astronomers met for the first time during that year. Messier continued to search for comets while compiling editions of his catalog until 1801, working with his close friend, catalog collaborator and comet rival Pierre Méchain. They discovered one comet together – the 1785 I Messier-Méchain, and one as co-discoverers with two others – the 1801 Pons (Pons-Messier-Méchain-Bouvard).

In his lifetime Charles Messier was credited with eleven comet discoveries, two co-discoveries and seven other independent co-discoveries.

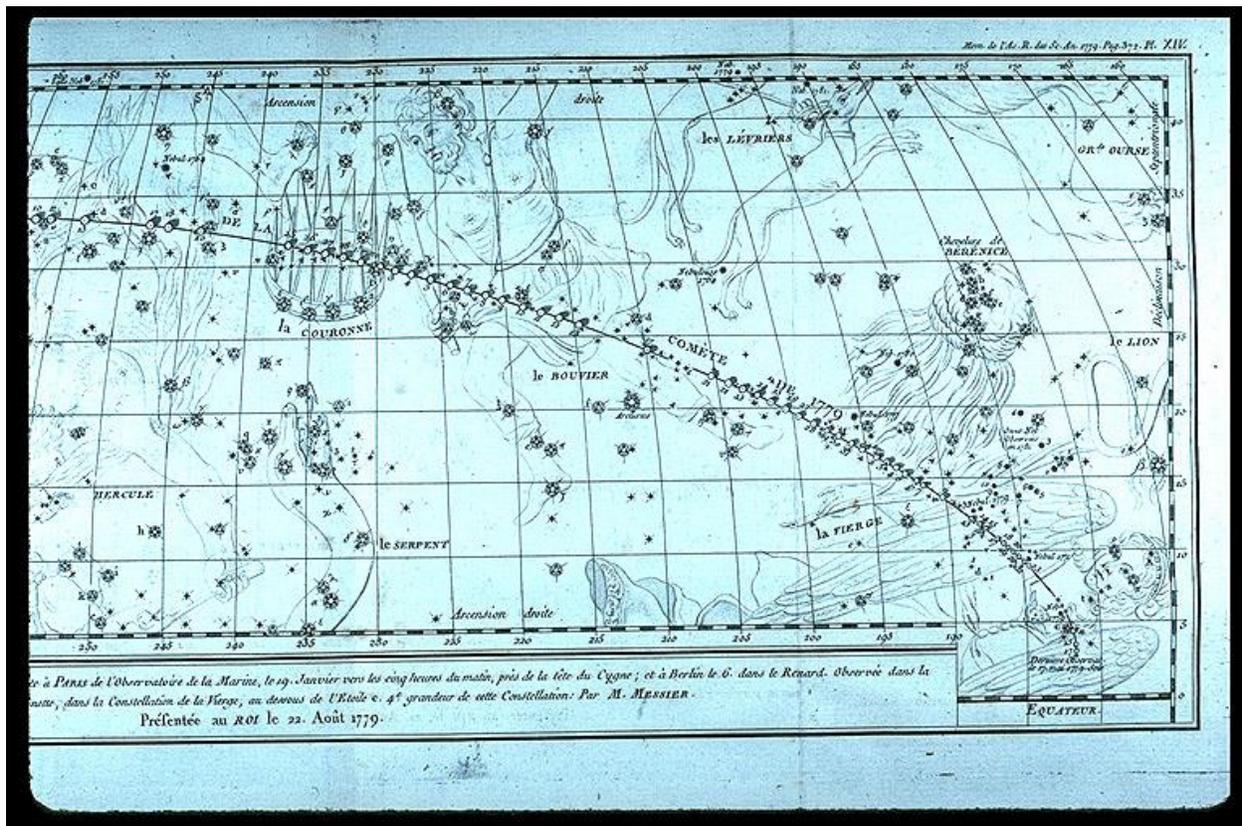
### *The Catalog's Beginnings*

Messier's first recorded observation of nebulae occurred in 1757. In this he reported viewing a companion object to the Great Nebula in Andromeda. The next year, while observing Comet 1758 De la Nux, Messier ran across a comet-like patch in the constellation of Taurus. Follow-up observations showed that the patch was not moving relative to the stars. He measured the position of the object, later to become the first entry of his catalog (M1), on September 12, 1758. In 1760 he encountered another unmoving patch (nebula), only to discover that it had already been charted 14 years earlier by Maraldi.

The discovery of a third such object in May 1764 appears to have prompted him to undertake a review of the available catalogs and to begin his own systematic scan of the sky searching for objects that might frequently fool comet observers. 1764 prove a banner year for him with 19 original discoveries. By year's end he had compiled a list of 40 objects to be avoided, adding another object to the list in early 1765 (M41).

He prepared a final version of his catalog containing 45 objects for publication in 1771 (it was eventually published in 1774), by adding well-known objects in the constellations of Orion, Cancer and Taurus to increased his tally to 45. This was likely done to both better an existing catalog of 42 objects published by Lacaille and to enhance his resumé in an attempt to gain an appointment to the French Royal Academy. On February 16, 1771, Charles Messier presented his list to the Paris Académie Royale des Sciences. In the decade that followed, Charles Messier continued to add to his list, frequently as a result of following the path of comets. The addition of sixteen objects in Virgo that occurred in 1779 was a direct consequence of his observation of the prominent comet of that year.

### *The Comet of 1779*



*The track of the Comet of 1779 through the constellations of Hercules, Corona Borealis, Boötes, Coma Berenices and Virgo, as sketched by Charles Messier. (Reproduced with the permission of [Linda Hall Library](#))*

### *Objects in the Coma-Virgo cluster*

The chart to the right is an enlarged excerpt of Charles Messier's drawing of the comet's path through the Virgo Cluster, marking the position of all 16 of his catalog objects in this region (12 other objects are to be found in the previous diagram):

Marked "Neb. 1779" in the lower right half is M61  
 Marked "Nebul. 1771" below the center is M49  
 Marked "3 Nebul. 1779" left of center are,  
     from left to right: M60, M59, and M58.  
 Marked "Onze Neb. Observées en 1781"  
 (Eleven Nebulae Observed in 1781) top of center  
 are objects M84-M91 and M98-M100:

1 = M98, 2 = M99, 3 = M100, 4 = M85, 5 = M84,  
 6 = M86, 7 = M87, 8 = M88, 9 = M89, 10 = M90  
 and 11 = M91 (in the wrong position).

For more details on these and other objects observed by Charles Messier, [visit the archive at Linda Hall Library](#). Messier was a highly skilled cartographer and [his charts](#), intended mainly to record the paths of comets he observed, were also some of the most up-to-date star charts of his time.



*The Virgo Cluster of Messier Objects*  
 (By permission of [Linda Hall Library](#))

### *The Catalog's Evolution*

The second version of the Messier catalog containing 68 objects was compiled in 1780 for a 1783 publication date. Two additional objects (found in 1780) made the appendix. Then in 1781 Messier and Méchain concentrated their efforts in the Coma Berenices-Virgo region, yielding 9 more. Additional observations and a mad rush to finalize the 1781 list for its planned 1784 publication yielded a third and final version which included Méchain's 3 additional observations. The number had now swelled to 103. There the matter rested for more than a century, though notes in Messier's personal copy identified an additional object (M104). Five more objects based on Méchain's observations and an object noted in an earlier Messier drawing (of the Great Andromeda Nebula in 1757) were added in the 20th century to generate the present day version of the Messier Catalog.

Messier is credited with the discovery 38 of the objects in the final list. Pierre Méchain contributed 28 more and Johan Bode contributed 6 objects.

### *The Mysteries and the Mistakes*

Messier's final version of 103 objects contains a few curiosities/mysteries and a few positional mistakes.

The two curiosities are M40 (a double star in Ursa Major) and M73 (an asterism of four stars in Aquarius). The mystery is that given Messier's knowledge of the objects they made the list and remained in subsequent versions. Messier identified M40 in 1764 as a close double star while searching for a nebula in the area charted by Hevelius. He did not find the nebula, noting that Hevelius might have mistaken the stars as such. Curiously it appears that he made the decision to leave this object in the list, perhaps providing an object to round out the total to 40. In case of M73, Messier observed a "cluster of three or four small stars, which resembles a nebula at first glance, containing very little nebulosity." It is speculated that this object may have been added because of his initial impression and its close proximity to M72, not because it would appear nebulous upon closer examination.

The four other objects (M47, M48, M91 and M102) are considered mistakes because no nebula or cluster appears at the positional data recorded for each.

For M47 in Puppis, no cluster is seen at the positional data recorded. The consensus is that Messier made a RA (Right Ascension) sign error during the reduction of its positional data. Computing the position of the cluster from the differences to the star 2 Puppis (2 Navis in his time), if you reverse the sign you end up at NGC 2422. That is an object originally discovered by Hodierna in 1664, and independently by Messier in 1771. It was not until 1959 that it was established that they were the same object.

For M48 in Hydra, again there is no cluster at the positional data recorded. The consensus is that M48 is NGC 2548 since it is the only object in area matching the description. RA is the same but Declination is off by 5 degrees. It has been hypothesized that since the RA is the same, Messier may have used the wrong reference star.

For M91 in Coma Berenices, there are several possible explanations and candidates. The recorded position lies in the densest portion of the Virgo cluster. Originally it was believed that M91 was NGC 4751, which lies slightly northwest of the recorded position and is the closet object to the position. However, one of the arguments against this is that it may have been too dim for Messier to see. It has also been suggested that M91 was a duplicate observation of M58. Others have suggested it may have been a comet observation (although this is unlikely). The most widely accepted explanation today is that Messier mistakenly used M58 instead of M89 as a reference point and therefore arrived at NGC 4548. NGC 4548 is the object listed in the published Messier Catalog today.

Finally, M102 in Ursa Major is now considered to be a duplicate observation of M101 by Méchain. The error is explained in a letter from Méchain to Bernoulli dated May 6, 1783, later published in an astronomy journal (*Berliner Astronomisches Jahrbuch*) in 1786. However there are still many holding out for NGC 5866, the argument being that it more closely matches Méchain's description and the data error is similar M48's.

### *Messier's Telescopes*

In an 1807 publication of *Connaissance des Temps*, Charles Messier listed the 11 different telescopes used for his observations during the years 1765 to 1769. These included a Newtonian reflector, two Gregorian reflectors and eight refractors (two of which identified as achromatics). All were listed with a fixed focal length and magnification, with no aperture recorded.

Reflectors of the period used speculum mirrors, as glass did not make an appearance in reflectors until about 1850. Based on the focal lengths and magnifications cited, it is believed the refractors listed were likely in the 80mm to 90mm range. In his research for *Sky & Telescope*, Owen Gingerich reported that Messier's instrument of choice during the period was a 7.5 inch Gregorian. Oddly enough, this instrument did not make list.

It is also known that Charles Messier lived in an apartment of the Hôtel de Cluny in the center of Paris and it is believed he used a 100mm refracting telescope from an observatory located at the top of a tower. Again this instrument did not appear the list. No trace of the facility remains today, as the building is now the *Musée national du Moyen Âge*.

What is clear is that Messier and his contemporaries used many different instruments for their observations, all of which would be outperformed by today's commercially available 4" Refractors and 6" Newtonians.



*M47/NGC 2422 in Puppis (above) and M48/NGC 2548 in Hydra (below). (Images: John Pappas)*



*The tower at the Hôtel de Cluny. (Photo: Dwight Lanpher)*

### *The Messier Marathon*

The first concept of a Messier Marathon can be traced to Spain in the 1960s, and then independently to several locations in the US in the 1970s. Late in that decade, there were 4 groups conducting marathons, two in California and one each in Florida and Pennsylvania. Walter Scott Huston reported on results of the Florida and Pennsylvania events for the March 1979 issue of *Sky & Telescope* and that set the ball rolling. The madness began in earnest with the first documented claims in 1985 of “bagging” all 110 objects in a single night.

As it turns out, up to 90 Messier objects are viewable in northern latitudes on most moonless nights during the year, with over 100 visible during the months of February, March, April and then again in October. Due to their positions in the sky, March is the month you can potentially catch them all in a single night.

### *Messier Marathon Challenges*

The modern day version of the Catalog contains 110 objects: 40 Galaxies (24 Spirals, 8 Ellipticals, 4 Lenticulars and 4 Barred), 29 Globular Clusters, 26 Open Clusters, 6 Diffuse Nebulae, 4 Planetary Nebulae, a Supernova remnant, a patch of the Milky Way (M24), along with a double star (M40) and two asterisms (M45 and M73).

There are some challenges to observing all these objects in a single night: identifying objects quickly at sunset and again at the following sunrise, as well as navigating the Virgo cluster.

Sunset challenges include M74 (a low surface brightness spiral galaxy) in Pisces and M77 (a small spiral galaxy) in Cetus, along with the objects in Triangulum, Cassiopeia and Andromeda which set quickly after dusk. Sunrise objects include M72 (a small globular cluster) and M73 (the four star asterism) in Aquarius and M30, the globular cluster in Capricornus. M30 is the last to rise and the most often missed. M74 at sunset is the second most missed object, given its sky position.

### *A Final Word*

After the discovery of a comet in 1798 it appears that Charles Messier felt the need to comment on the reason for compiling his catalog. For a publication of the *Connaissance des Temps* that year he wrote:

*What caused me to undertake the catalog was the nebula I discovered above the southern horn of Taurus on September 12, 1758, whilst observing the comet of that year. This nebula had such a resemblance to a comet in its form and brightness that I endeavored to find others, so that astronomers would no more confuse these same nebulae with comets just beginning to appear. I observed further with suitable refractors for the discovery of comets, and this is the purpose I had in mind in compiling the catalog.*

*After me, the celebrated Herschel published a catalog of 2000 which he has observed. This unveiling of the heavens, made with instruments of great aperture, does not help in the perusal of the sky for faint comets. Thus my object is different from his and I need only nebulae visible in a telescope of two feet [focal length].*

In the end he remained primarily a comet hunter, immortalized for a list of objects to be avoided in their search.

- [John Pappas](#)

### *References:*

Stephen J. O'Meara: “*Deep-Sky Companions: The Messier Objects*”

Leslie C. Peltier: “*Starlight Nights: The Adventures of a Star-Gazer*”

Harvard C. Pennington: “*The Year-Round Messier Marathon Field Guide*”

The SEDS archive at **Linda Hall library**: <http://messier.seds.org/xtra/history/biograph.html>

[The Charles Messier history section at SEDS is the winner of the **Britannica Internet Guide Award** for one of the best sites on the Worldwide Web when reviewed for quality, accuracy of content, presentation and usability.]

**NHAS March 2015 Business Meeting Report**

The monthly business meeting was held at St. Anselm College, Manchester NH on March 13th, with our President **John Bishop** presiding. The Treasurer’s report by “**Rags**” follows on the next page.

**President’s Report**

The relentless procession of recent snow storms has meant that most public observing events have been cancelled or postponed to later in the year. March 20 (or 21) signals the Spring Marathon at the **Linda and Larry Lopez** casa, while at the Rey Center on March 21, Boy Scout Troop 56 is going for their Astronomy Merit Badges and extra NHAS help would be most welcome. We still need a coordinator to AeroSpaceFest at MSDC, while **Gary Duranko** has offered to help with NEFAF. **Rags** will look into having the Summer Barbeque at Greenfield State Park.

**Other Reports**

**EOC: (Scott McCartney)**

The next meeting is at Manchester Public Library on Thursday March 19. We are exploring in-reach activities and **Don Byrne** will be coordinating events at Benedictine Park. NHAS Bookmarks have been printed to hand out at public activities and events (**Steve Rand**).

**YFOS: (Larry Lopez)**

There were terrible problems getting maintenance done this winter: the door jammed, heater failed. Maintenance such as shoveling path to porta-potty is a membership responsibility, not just Larry’s, so if interested in maintaining the YFOS site, contact Larry.

**Astronomical League: (Ken Charles)**

**Ed Ting** has completed the Messier program and received the AL letter, certificate and pin.

**Speaker Search Committee: (Michelle Thomas)**

12 responses have been received in our survey so far. 3 invitations have been sent for now, with one reply (Robert Fesen, Dartmouth’s Physics and Astronomy dept.s). Our contact email address is: [speakers2015@nhastro.com](mailto:speakers2015@nhastro.com).

**Astronomy Shorts**

**Paul Wilanski:** Comet Lovejoy is still with us, at 5.5 mag and now in Cassiopeia.

“**Rags**”: YFOS orientation for a few new members took place on February 27 (see page 4).

**Bruce Berger:** Asteroid (3) Juno will occult the star Tycho 0803-00156-1 at 01:16 UT on April 1, i.e. evening of March 31. Kelly Beatty and Bruce are also putting on an astronomy program in Maine: a dedicated one week star party at the Maine Astronomy Retreat, Washington, Maine.

**Book of the Month**

**Steve Rand** presented “50 Ideas You Really Need to Know” by Joanne Baker, with essays on 50 significant topics of Astrophysics..

**Scope of the Month**

**Rob Mack** presented his Telescope World 12” F/6 Newtonian. Since the setup weighs 300 pounds, it was only virtually present. Additional details will be in the [April 2015 Observer](#).

**The Evening Presentation**

**John Bishop** presented “The Drake Equation and the Great Filter” – a look at that hypothesis, Fermi’s paradox, the Rare Earth hypothesis and Jupiter’s importance, concluding that life is common but complex life is rare. [His slides are available to members at the Meetings Forum](#).

$$N = R_* \cdot f_p \cdot n_e \cdot f_t \cdot f_i \cdot f_c \cdot L$$

**The Drake Equation**



**Ed Ting** being presented his Messier pin and AL certificate by **Ken Charles**. (Photo: **Ed Ting**)

### *NHAS Treasurer's Report* (as of March 10, 2015)

|                                   |                    |   |                       |
|-----------------------------------|--------------------|---|-----------------------|
| <b>Starting Checking Balance:</b> | <b>\$14,484.58</b> | <b>Membership:</b>  | <b>115</b>            |
| <b>Deposits:</b>                  |                    | <b>Single + Family</b>                                    |                       |
| Membership                        | 144.15             | Cash Renewals:  | 0x30.00+0x10.00 0.00  |
| Donations                         | 374.50             | Cash New Members  | 0x30.00+0x10.00 0.00  |
| Interest                          | 0.33               | PayPal Renewals:  | 2x28.83+0x 9.61 57.66 |
| <b>Total:</b>                     | <b>\$518.98</b>    | PayPal New Members:                                       | 3x28.83+0x 9.61 86.49 |
|                                   |                    | <b>Total:</b>   | <b>5 \$144.15</b>     |
| <b>Expenses Paid:</b>             |                    | <b>Current Members:</b>                                   | <b>120</b>            |
| Rackspace Cloud (Web site)        | 59.98              | <i>[14 Family memberships; 56 members paid by PayPal]</i> |                       |
| Cynric Company, LLC<br>(Plowing)  | 1105.68            | <b>New Members:</b>                                       |                       |
| GoDaddy                           | 12.27              | John Desbiens   | Hillsborough NH       |
| USPS (PO Box for 1yr)             | 192.00             | Greg Freeman  | Silver Lake NH        |
| Liberty Mutual Insurance          | 1701.00            | Brian Chevrette   | Manchester NH         |
| Amazon (ScanSnap doc system)      | 417.99             | <b>Donations:</b>   |                       |
| Amazon (128GB flash drive)        | 43.79              | Parkside Middle School                                    | GEN 50.00             |
| <b>Total:</b>                     | <b>\$2,414.76</b>  | Olivia Rodham Memorial Library                            | LTP 162.00            |
| <b>Current Checking Balance:</b>  | <b>\$12,069.82</b> | Harrisville Public Library                                | LTP 162.50            |
| <b>Petty Cash:</b>                | <b>\$100.00</b>    | <b>Total:</b>   | <b>\$374.50</b>       |
| <b>Current Cash Balance:</b>      | <b>\$12,169.82</b> |   |                       |
| <b>EOC Share:</b>                 | <b>\$7,057.52</b>  |   |                       |

### *Contact Information*

#### How to join NHAS

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

Send Email to: [info@nhastro.com](mailto: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](mailto:ramax.astro@yahoo.com)

#### *NHAS Officers:*

*President:* [John Bishop](#)  
*Vice-President:* [Tom Cocchiaro](#)  
*Secretary:* [Paul Winalski](#)  
*Treasurer:* [David "Rags" Gilmore](#)

#### *Board of Directors:*

[Ken Charles](#)  
[Pete Smith](#)  
[Steve Rand](#)



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

**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.  
 Instruction booklet and an Audubon constellations guide.  
 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 and a Moon Map.  
 Richard Berry’s “Discover the Stars”

**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.

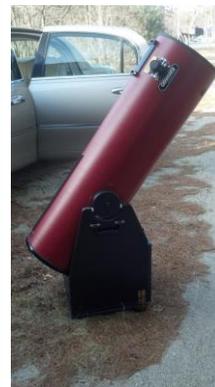


**Orion XT6 – 6” Newtonian on a Dobson mount**

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

*Equipped with:*

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



**Coulter Odyssey 10” Newtonian on a Dobson 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, independently of the telescope and in a separate slip-case:*

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



**Meade 8” Newtonian on a Dobson 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 Dobson 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)

**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                               |
|---|---------------------|---------|--|
| First Friday Skywatch for MSDC                | Friday, April 3     | 7:00pm  | MSDC, Concord NH                       |
| Sanborn Regional School Skywatch              | Tuesday, April 7    | 7:00pm  | 31A West Main St., Newton NH           |
| Goffstown High School Skywatch                | Thursday, April 9   | 7:30pm  | 27 Wallace Road, Goffstown NH          |
| NHAS Business Meeting                         | Friday, April 10    | 7:30pm  | MSDC, Concord NH                       |
| Thorntons Ferry School Skywatch               | Wednesday, April 15 | 7:45pm  | 134 Camp Sargent Rd, Merrimack NH      |
| Gordon-Nash Library Skywatch                  | Thursday, April 16  | 6:30pm  | 69 Main Street, New Hampton NH         |
| EOC Meeting                                   | Thursday, April 16  | 6:30pm  | Manchester City Library, Manchester NH |
| Gordon-Nash Library Skywatch<br>(backup date) | Friday, April 17    | 6:30pm  | 69 Main Street, New Hampton NH         |
| Coffee House Night at YFOS                    | Saturday, April 18  | 5:00pm  | YFOS                                   |
| Rey Center Skywatch                           | Saturday, April 18  | 8:30pm  | Waterville Valley NH                   |
| Beech Hill School Skywatch                    | Tuesday, April 21   | 7:00pm  | 20 Beech Hill Road, Hopkinton NH       |
| Beech Hill School Skywatch<br>(backup date)   | Wednesday, April 22 | 7:00pm  | 20 Beech Hill Road, Hopkinton NH       |
| Maple Avenue Elementary Skywatch              | Thursday, April 23  | 7:30pm  | 16 Maple Avenue, Goffstown, NH         |
| Sidewalk Astronomy Skywatch                   | Saturday, April 25  | 6:00pm  | Market Square, Portsmouth NH           |
| J A Tarbell Library Skywatch                  | Tuesday, April 28   | 8:00pm  | 192 Forest Rd, Lyndeborough, NH        |
| J A Tarbell Library Skywatch<br>(backup date) | Wednesday, April 29 | 8:00pm  | 192 Forest Rd, Lyndeborough, NH        |
| First Friday Skywatch for MSDC                | Friday, May 1       | 7:00pm  | MSDC, Concord NH                       |
| Portsmouth Children's Day Skywatch            | Sunday, May 3       | 12:00pm | Market Square, Portsmouth NH           |
| Sanborn Regional School Skywatch              | Tuesday, May 5      | 7:30pm  | 31A West Main St., Newton NH           |
| NHAS Business Meeting                         | Friday, May 8       | 7:30pm  | St. Anselm College, Manchester NH      |
| Manchester Girl Scouts Skywatch               | Saturday, May 9     | 8:00pm  | Camp Farnsworth, Thetford VT           |
| Goffstown High School Skywatch                | Thursday, May 14    | 8:00pm  | 27 Wallace Road, Goffstown NH          |
| Coffee House Night at YFOS                    | Saturday, May 16    | 5:00pm  | YFOS                                   |
| Rey Center Skywatch                           | Saturday, May 16    | 9:00pm  | Waterville Valley NH                   |
| EOC Meeting                                   | Thursday, May 21    | 6:30pm  | Manchester City Library, Manchester NH |
| Sidewalk Astronomy Skywatch                   | Saturday, May 23    | 6:00pm  | Market Square, Portsmouth NH           |

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

| Date               | Time       | Lunar Phase     |
|--------------------|------------|-----------------|
| Saturday, April 4  | 8:06am EDT | ☉ Full moon     |
| Saturday, April 11 | 11:44pm    | ☾ Last quarter  |
| Saturday, April 18 | 2:57pm     | ☾ New moon      |
| Saturday, April 25 | 7:55pm     | ☽ First quarter |
| Sunday, May 3      | 11:42pm    | ☉ Full moon     |
| Monday, May 11     | 6:36am     | ☾ Last quarter  |
| Monday, May 18     | 12:13am    | ☾ New moon      |
| Monday, May 25     | 1:19pm     | ☽ First quarter |

**Credits**

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

John Bishop, Herb Bubert, *Glenn Chapple*, Tom Cocchiaro, Gardner Gerry, "Rags" Gilmore, Dennis Isbell, Dwight Lanpher, Larry Lopez, Rob and Brian Mack, John Pappas, Steve Rand, Ed Ting and Paul Winalski.