MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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Report #119

NGC 1514 Planetary Nebula In Taurus

"Sharing Observations and Bringing Amateur Astronomers Together"

Introduction

The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It's open to everyone that's interested, and if you're able to contribute notes, and/or drawings, we'll be happy to include them in our monthly summary. We also accept digital imaging. Visual astronomy depends on what's seen through the eyepiece. Not only does it satisfy an innate curiosity, but it allows the visual observer to discover the beauty and the wonderment of the night sky. Before photography, all observations depended on what the astronomer saw in the eyepiece, and how they recorded their observations. This was done through notes and drawings, and that's the tradition we're stressing in the Observers Challenge. We're not excluding those with an interest in astrophotography, either. Your images and notes are just as welcome. The hope is that you'll read through these reports and become inspired to take more time at the eyepiece, study each object, and look for those subtle details that you might never have noticed before.

NGC 1514 Planetary Nebula In Taurus

NGC 1514, or the Crystal Ball Nebula, was discovered by William Herschel on November 13, 1790. It lies approximately 2,200 light-years away in the constellation of Taurus and shines at a relatively bright mag. 9.43 to 10, depending on the source. It's a moderate-sized planetary at 1.9', but requires clear, dark skies to eke out details. It may contain a tightly orbiting double star with a period of ten days, partially giving it its off-round shape as seen in detailed images. Recent developments may contradict that theory. Visually, it usually appears round unless employing the largest backyard telescopes.

Observations/Drawings/Photos

Corey Mooney: Observer from Massachusetts

NOTE: We'd like to introduce new Challenge participant Corey Mooney from the ATMoB. Welcome Corey!

On January 11, 2019, I brought my Electronically Assisted Astronomy (EAA) setup to the ATMoB clubhouse. It consists of an ultra-low read noise IMX224 CMOS camera, in a fast 114mm (4.4-inch) F/4 Newtonian, riding on a GOTO converted equatorial mount. The camera and mount are controlled by a mini PC running SharpCap 3.2. The mini PC is connected to a mini WIFI router, which allowed me to remote desktop into the EAA system from a computer inside the warm clubhouse.

Eileen Myers and John Stodieck were also at the clubhouse and participated in this EAA observation. Using a second wide field camera with an on-screen crosshair as an E-finder, we were able to use paper charts to star hop from Atik to the parallelogram of mag. 8.5-9.5 stars that encompass NGC 1514. We then switched to the telescope's camera and a faint, circular green-blue glow confirmed we were on target. After framing the nebula, I adjusted the exposure and gain to get a good histogram and began live stacking the incoming frames.

Live stacking takes the noisy high-gain short exposures and aligns and averages them together, reducing the noise as more and more frames get averaged. Because each short exposure gets aligned on its way in, it's also very forgiving on mount quality.

It was fun, as a group, to watch the image being refined as more frames came in, and to be able to point out and discuss evolving details. Eileen was the first to notice the large circular dark hole to the south of the central star. As more frames averaged together, I was able to stretch

the histogram more aggressively, which began to show more mottled details in the nebula. It appeared to have four bright lobes and four darker patches, almost like a lopsided four leafed clover. After checking a reference picture online, I tried to see if we could detect the fainter outer shell, but no luck. No amount of stretching would reveal it. (Looking back, I clearly applied the wrong dark frame correction, so there are some hot pixel streaks and uncorrected amp glow. Oops)

The image consists of 42 live stacked 16 second exposures at max gain, totaling 672 seconds of integration time.

More detail could be pulled out of this picture, but I didn't want to edit it because this is how it looked when we observed it that night.

After I unintentionally ended the EAA session (thick frozen grease caused the mount to lose steps during a meridian flip), we went outside to join the visual observers. I got to briefly look at NGC 1514 in a member's 16-inch Dob with an OIII filter. What a treat. The inner shell was clearly visible, and I could just make out the largest darker patch. I was not able to see the faint apparent double, but the seeing was pretty bad that night.

To be fair, I didn't spend enough time with it to really soak in all of the details visually.

James Mullaney: Observer from Delaware

NGC 1514 in Taurus is sometimes called the "Crystal Ball Nebula," but I've coined the name "Herschel's Revelation" as being far more significant. This is the object that convinced Sir William that nebulae were real, and not, as was the belief then, just masses of unresolved stars. His profound insight came at seeing the clear separation of the surrounding nebula from the obvious central star. Yet another of Herschel's many amazing observations based solely on the visual appearance of an object in his telescopes!

Derek Lowe: Observer from Massachusetts

I finally got a chance to observe NGC 1514 again, so here's what I have on it with an 18-inch Dobsonian.

"In the 32mm (69×) without a filter, I had to look fairly close to tell that this was a planetary at all, and not a field star. It was easy to miss in suburban skies. With an OIII filter, naturally, it was a wide circular zone of fuzz that became apparent around the central star, a weirdly bright one for a planetary nebula (as has been noted ever since Herschel's discovery). At 138× with the OIII, the fuzzball seemed almost perfectly circular, but despite several tries, I'd not want to swear to seeing structure in that view. An Ultrablock filter at 138× gave a brighter view, but otherwise quite similar. Through a 5mm (437×) with the Ultrablock, the view of the nebula was overall less impressive than with lower magnification and wider field, but what was apparent was the gap between the central star and the outer nebulosity. It wasn't a perfect circle. I could see an irregular margin with averted vision, which was really the main structure that I was able to pick out this evening."

I also had a nice look at NGC 2174/75, which I hadn't seen before. I'm hoping to see that one again at the end of the month, so I'll hold off for now! I was approaching it cold (well, literally, but also without having looked up the description), and mostly looked around the central portion near the mag 7.5 field star. I'd like to have a look at the other parts of the nebula on my next run.

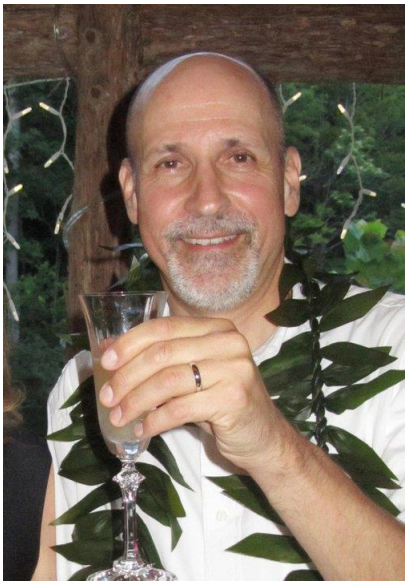
Ed Fraini: Observer from Texas

Our observation of NGC 1514, the Crystal Ball Nebula, was made on the night of January 27, 2019 under very good astronomical conditions. With the temperature in the low 50's, no wind, and low humidity, the seeing was exceptional. I detected no scintillation in Capella and observed M38 in Auriga with ease. This night was one of few in which I personally could clearly identify the seven sisters of the Pleiades with the naked eye, which is unusual for me, observing from the club's dark site west of the Houston light dome. Near the challenge object area, with concentration, we could detect Tau Perseus, setting the NELM at 4.95, which might be a record best for these old eyes.

We observed NGC 1514 intermittently over a period of two hours as it approached the meridian, utilizing the main scope, a 14-inch SCT, in the Houston Astronomical Observatory located near Columbus, Texas. We noticed a notable improvement in the view as the target moved up to lower and lower air mass values. The field was verified while using a 40mm eyepiece, which provided wonderful views. We often use the eyepiece as a substitute finder scope when observing. In the 40 mm at 98×, we saw the central star of NGC 1514 as the center of a three-line star group equally spaced north to south with a slight bend to the east. From the east most star, a well-defined arc of four-plus stars arched up and around south of the nebula. There were two additional bright stars to the west and on a westerly line. After more observations at higher powers, 150×, 230×, and 300×, it appeared the best views of the nebula were with a 17mm at 230×. The nebula at this power seemed quite large. A fellow observer noted that if the central star was a pinpoint, then the nebula was dime sized. The nebula appeared faint and translucent, and somewhat bow-tie shaped in appearance. The concentration of light seemed stronger on the upper left as viewed in the eyepiece, the eastern side. It did appear somewhat detached from the central star and had a notable fall off of intensity along the bottom margin as observed in the eyepiece.

Having observed relatively few planetary nebulae, as I typically found them uninteresting, I was very elated on making this target observation and seeing quite a bit of notable features.

James Dire: Observer from Illinois



NGC 1514 is an approximately mag. 10 planetary nebula in the constellation Taurus. The nebula is located about 8° north-northeast of the Pleiades. Although located in Taurus, the closest naked-eye star is mag. 2.9 Zeta Persei, which, as you might guess, is in the constellation Perseus. The nebula is located 3.5° east-southeast of Zeta Persei. The easiest way to star hop to NGC 1514 is follow a line from mag. 3.8 Omicron Persei past Zeta Persei, a distance east-southeast equal to 1.5 times the separation of Omicron and Zeta Persei!

William Herschel discovered NGC 1514 on November 13, 1790 using his 18.7-inch (48 cm) Newtonian reflector. The telescope had a focal length of 20 feet! The telescope had a copper alloy coating on the primary mirror with reflectivity of 60%. If we assume his secondary had the same reflectivity, this telescope would have had the same amount of light delivered to the eyepiece as a typical 12-inch modern Dobsonian telescope. However, since his eyepieces were not as good as modern eyepieces, I would guess an 8-10 inch modern telescope would reveal NGC 1514 as bright as Herschel saw it in his scope.

Herschel thought nebulae were masses of stars too distant to resolve. After finding NGC 1514, he started to think differently about the origins of nebulae. He saw this one as a star surrounded by a faint "atmosphere" around 3 arcminutes in diameter.

NGC 1514 has a mag. 9.5 central star, one of the brightest central stars for any planetary nebula in our sky. For years, astronomers thought the central star was a binary star, as its spectra showed the presence of two stars. However, research based on radial velocity studies published by Cornell astronomers in 2016, indicate that the two unresolved stars are an optical double, not a true binary.

The nebula has approximately the same brightness as its central star. The pair is estimated to lie 2,300 light-years away.

My image was taken with a 190mm f/5.3 Maksutov-Newtonian telescope using an SBIG ST-2000XCM CCD camera. The exposure was a mere 40 minutes. In the image, north is up and east to the left. The exposure has about the same detail visible in my 14-inch Dobsonian at 164×, sans color. Structure in the nebula is clearly visible, along with the central star. A fainter star not affiliated with the nebula is visible close to the central star.

The bright orange-red star in the image, below the nebula, is mag. 8.1. To the left of it is another orange-red star of mag. 8.7. Both stars are spectral class K0, and are separated by 13 arcminutes, to give the scale of the image. Images of NGC 1514 taken with much larger telescopes reveal several more faint starts "within" the nebula that are either foreground or background stars.

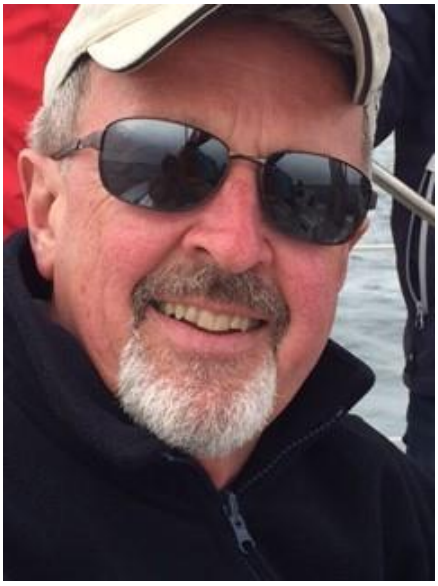
Gary Ahlers: Observer from Nevada

NGC 1514 is a planetary nebula in the constellation Taurus. There are several very unusual features in this nebula. First, it's a binary star system with an orbital period of about 10 days. One star is dying and expelling its outer shell of gases. Most planetary nebulae are spherical, or symmetrically lobed. Here, however, tidal forces generated by the binary orbits have the complex design of whorls within the gas cloud.

The second feature has only been found by WISE satellite infrared imagery in November, 2010. There are two parallel rings of glowing dust just outside and surrounding the visible light gas shell.

This closeup image is from an ACF-10 @ f/10. 15 frames at 12 seconds with a QHY 8L camera. North is to the left and east is at the top.

John Bishop: Observer from Massachusetts



On January 25, 2019, I observed planetary nebula NGC 1514 from the ATMoB Clubhouse in Westford, MA. I used an 8.25-inch reflector at 48×, 100×, and 133×. I used a UHC filter at 100× and 133×.

Conditions were generally favorable. The sky was clear. Transparency and seeing were fair to good. The waning gibbous Moon rose at about 10:30 pm. Air temperature at 11:30 pm was 23°F.

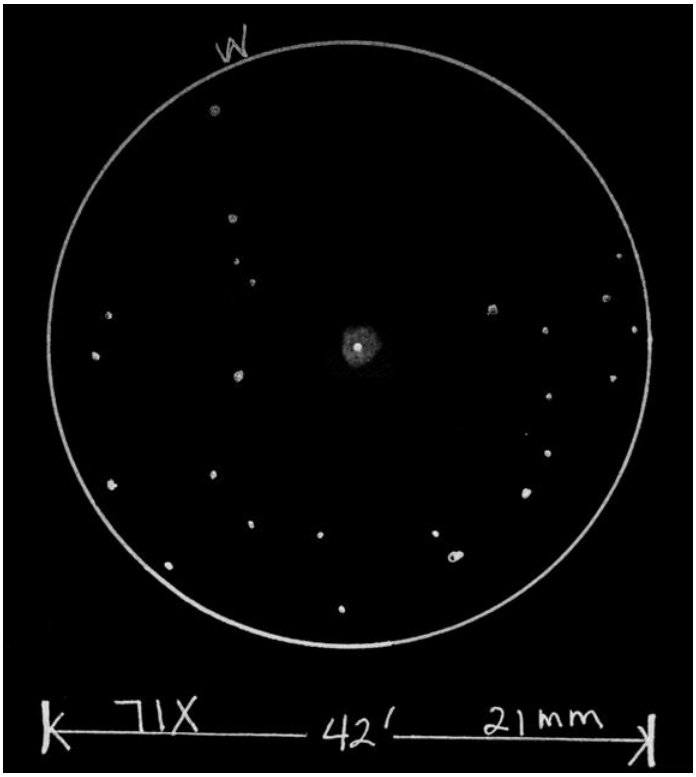
Using Omicron Persei and Zeta Persei as pointers, I located the field, but could not confirm seeing NGC 1514 at 48× using my 2-inch 50mm eyepiece, without filter. There was slight fuzziness around what proved to be the central star, but it couldn't be readily distinguished it from the field stars.

When I switched to 1.25-inch eyepieces and a UHC filter, the nebula revealed itself. The view at 100× and 133×, with filter, was an attractive one. There were three relatively bright stars in a line against a dark background, with the nebula centered in the field of view. It formed a faint, circular halo around the bright middle (central) star. Averted vision was helpful in seeing the extent of the nebulosity. The nebula sometimes had a bluish tint, which I assume was an effect of the filter. I couldn't see the structure or detail described by others, or shown in images. There did appear to be a gap or dark space between the central star and the nebula, like a donut hole. I wondered if this was real, or an illusion caused by the glare from the relatively bright central star.

NGC 1514, faint and faintly blue, had an eerie, ghostlike quality in my telescope that made it an interesting object to observe. I'd like to spend more time with it to tease out some detail.

Kenneth Drake: Observer from Texas

I got an opportunity to observe NGC 1514 on January 4, 2019, with very clear skies and an SQM of 20.19, the dew point in the low 30s. I easily located the nebula bracketed by several mag. 7-8 stars. The mag. 9 central star was obvious, even with the OIII filter, whereas the glow of the nebula was not. Both the UHC and OIII made the round planetary appear as ~2' in size glow slightly fainter at the edges. I saw it best at 71× in the 13-inch w/OIII filter.



Doug Paul: Observer from Massachusetts

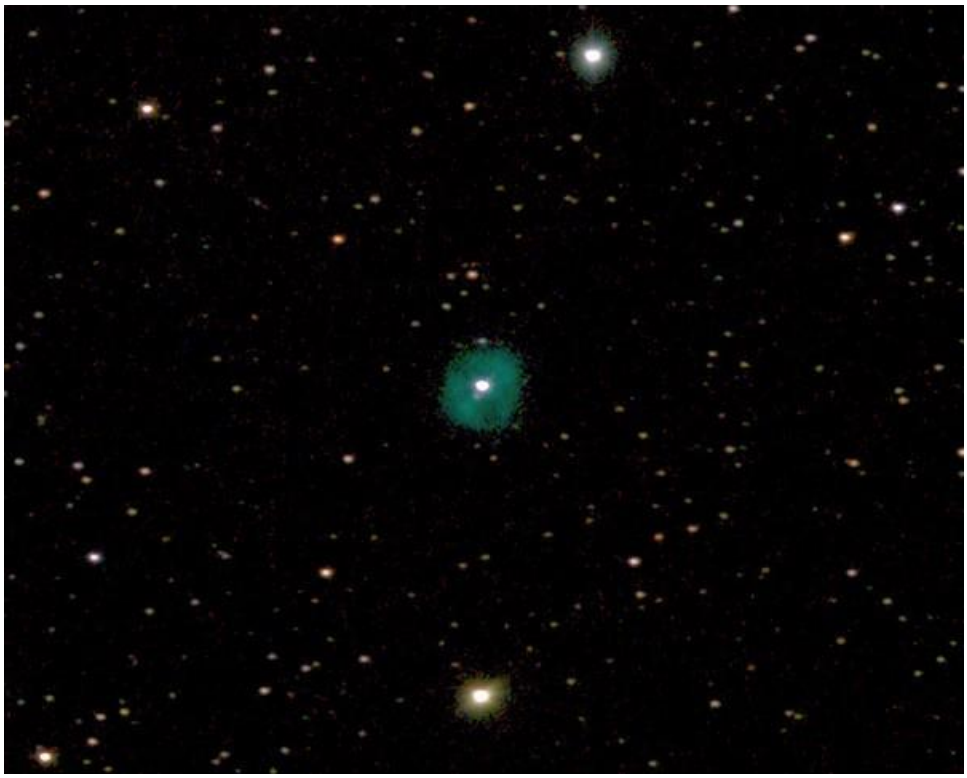
It was a chilly evening, starting at 25°F and finishing at 16°F in my lovely light-polluted back yard. The skies were clear, with an NELM of 4.5 and no moon. I imaged the comet 46P/Wirtanen, and NGC 1514 (Crystal Ball Nebula) at an altitude of ~77° degrees along with five more objects.

I calibrated the setting circles on Elnath and jumped over to NGC 1514, getting it in the FOV on the first try. I centered it and started shooting.

Technical details: Canon 80D at ISO 800 (unmodified), 400mm f/2.8 (142mm aperture) lens with no filters, Sky Watcher Star Adventurer mount, 33×30sec = 16.5 min.

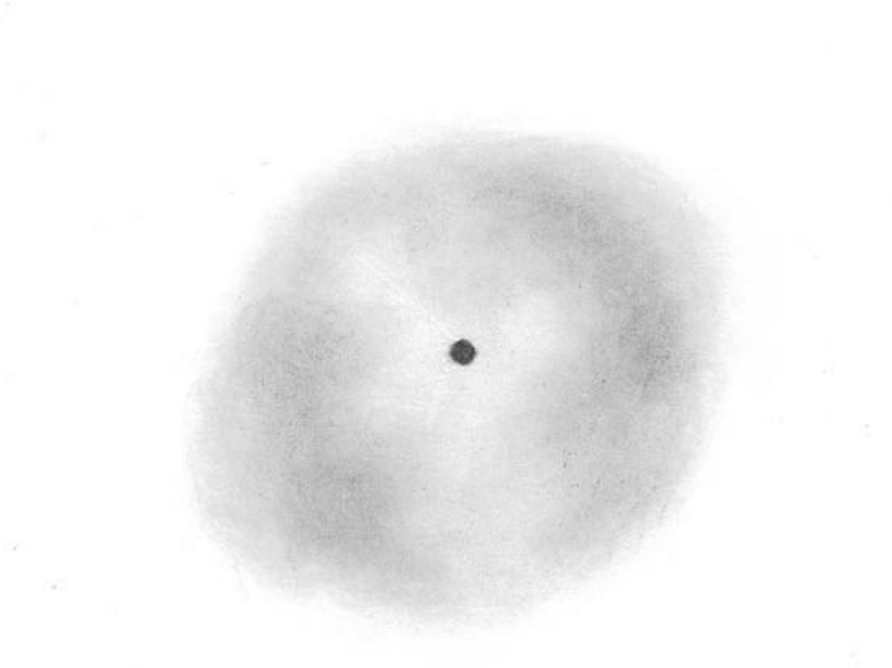
Processed with Regim (lights, flats, darks, registration, and stacking) and my own stretcher. I use a daylight white balance with no color enhancement with the goal of producing natural colors. 100% scale.

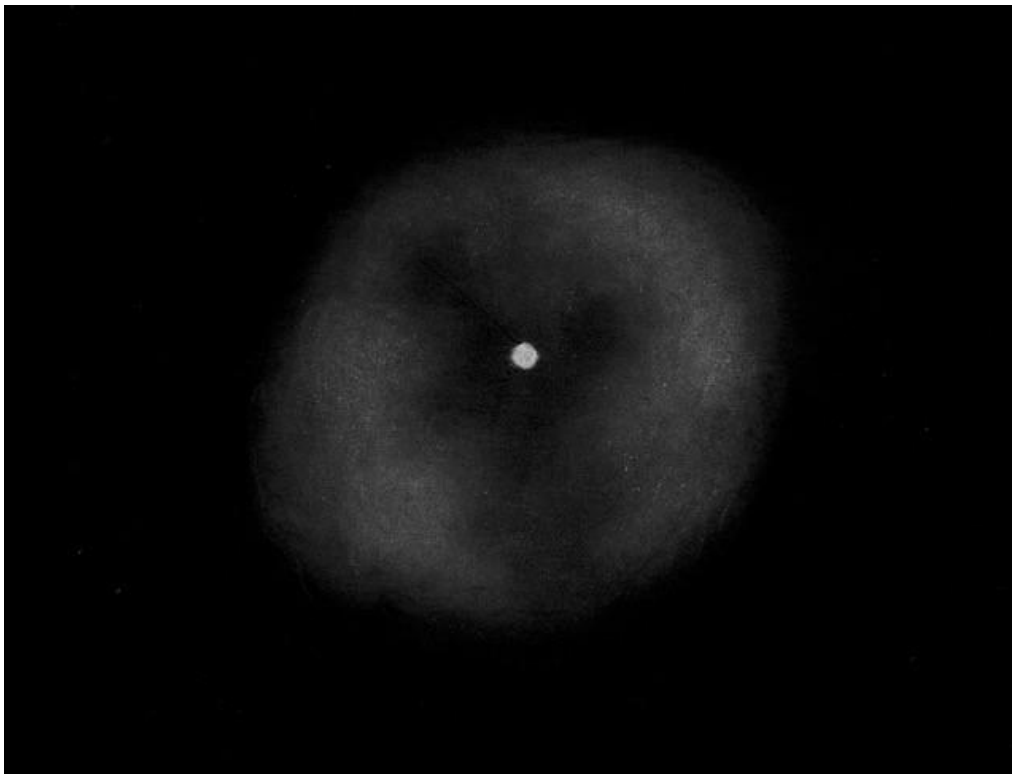
Orientation: North up.



Sue French: Observer from New York

I've observed NGC 1514 thrice with my 15-inch f/4.5 reflector, and it's wonderfully complex. The sketch was made at 216× with a UHC filter. I may not have gotten all the lumps and bumps in exactly the right place, but it gives the general impression.





Joseph Rothchild: Observer from Massachusetts

I finally had a clear night and dark skies on Cape Cod on February 1, 2019. It was 18°F and windy, which limited observing at higher power. I was able to observe both NGC 1514 and NGC 2300, which were both new objects for me.

I observed with my 10-inch reflector. NGC 1514 was easy to locate, but I initially saw it only with an NPB filter at 55×. There was a small glow around the central star which was bright. I couldn't see any details. Once I had located the nebula with the filter, I was able to see it at 88× without a filter, but it was barely visible.

NGC 2300 was also easy to find star hopping from Polaris with my finder. I initially could not see it at 45×, but it was readily visible at 88× as a small compact glow between 2 adjacent stars. I could not definitely see the nearby galaxy NGC 2276, but saw a grainy appearance in the expected location with averted vision.

Chris Elledge: Observer from Massachusetts

On January 6, 2019 @8:30pm EST, I used a 10-inch f/5 reflector to observe NGC 1514 from the ATMoB Clubhouse. Sky conditions were: Bortle Scale 6. NELM 5.0. Transparency good. Seeing poor.

I found it by starting at Zeta Persei and star hopping via the HD 25033 & HD 281396 close star pair, HD 25295, and finally to the line of stars HD 26125, HD 281679, and HD 26104. The center star of that line is also the central star of the NGC 1514 planetary nebula. While star hopping at 36×, I didn't see the planetary as anything more than some faint fuzziness around the star. Adding an OIII filter enhanced the contrast enough to clearly see that the fuzziness was actually the planetary nebula surrounding the star.

Stepping up to 127× (10mm, 0.6° FOV), the line of 3 stars stretched across the view. They were mag. 8 for the 2 end stars and mag. 9 for the center star. The center star was really surprisingly bright for the central star of a planetary nebula. I wasn't expecting to see it so brightly, and had mistakenly assumed upon first glance that it was a compact bright nebula. Once more, adding the OIII made the surrounding planetary nebula appear, but now averted vision was required for me to see it. I couldn't see any structure beyond what appeared to be a glowing ball around the central star between 1 and 2 arc-minutes across.

At 270× (4.7mm, 0.3° FOV), there was no change in the central star's appearance, but the nebula was not noticeable. Even with an OIII filter in place, it was very difficult to see it with averted vision.

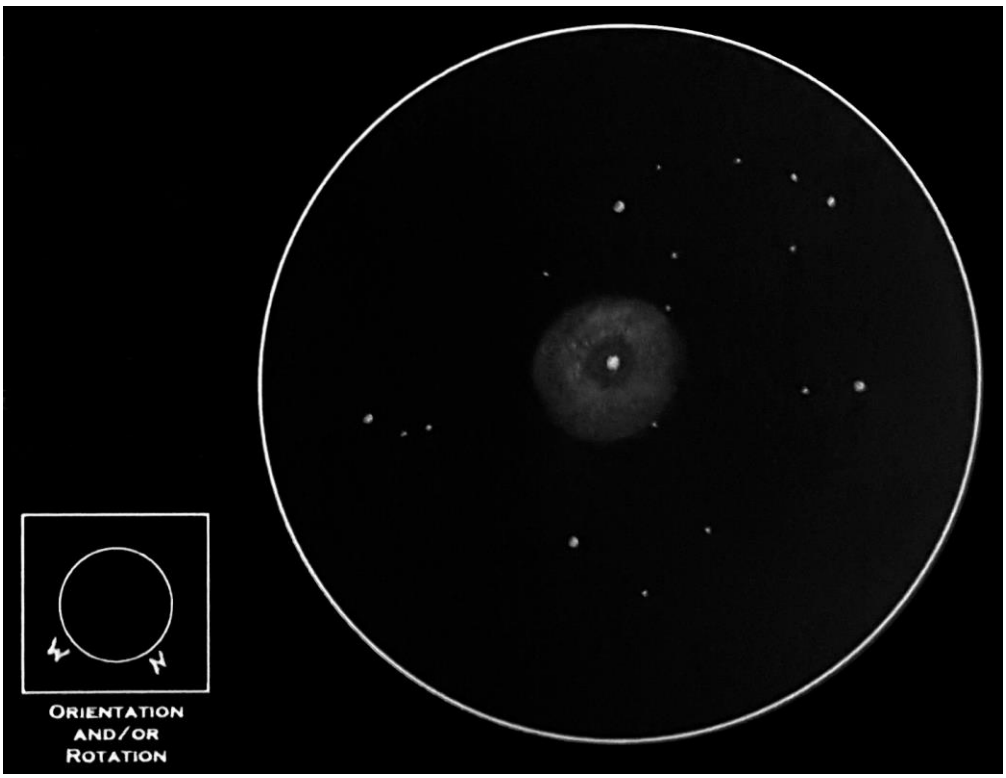
Mike McCabe: Observer from Massachusetts

The Las Vegas Astronomical Society's Observer's Challenge object for January, 2019 was NGC 1514, aka 'The Crystal Ball Nebula', and is a planetary nebula located in the constellation Taurus. The center of NGC 1514 is thought to possibly contain not one, but two dying stars that have produced the nebulosity we see today. The center, whether one or two stars, is easily seen in almost any telescope as one star of about mag. 9. The nebulosity is a bit more of a challenge to see.

My first attempt at it came on the evening of December 29, 2018, while I was out having a look at comet 46P/Wirtanen. Since the comet was my primary concern for the evening, and I really didn't have any other observing plans for that night, I had only deployed my 80mm (3-inch) F/7 ED refractor. The thought to drop in on NGC 1514 was on a whim, and I had no idea what to expect. The sky was relatively transparent at 3/5, with the seeing coming in at 2/5. I grabbed my charts and slewed to Zeta Persei, from whence the star hop was a straightforward affair down toward the eastern horizon. I found the central star(s) always easy to see, and after working the area with everything from 30× – 140× with the little scope, I concluded that there would be no sighting of the nebulosity on that evening.

My second attempt came just three nights later, on the night of New Year's Day 2019, in fact, when again, my primary concern for the evening was the comet, and everything else was secondary. On this night, I had deployed my 4.5-inch F/8 reflector, and the seeing was 2/5 with the transparency hovering in the 2-3/5 range. Working with powers of 45×, 130×, and 185×, I found that I could detect the barest hint of the nebulosity at 130×. I also tried employing the use of an OIII filter to accentuate the nebulosity, but found it to be too intrusive when coupled with the small optics to be effective in drawing out the nebula.

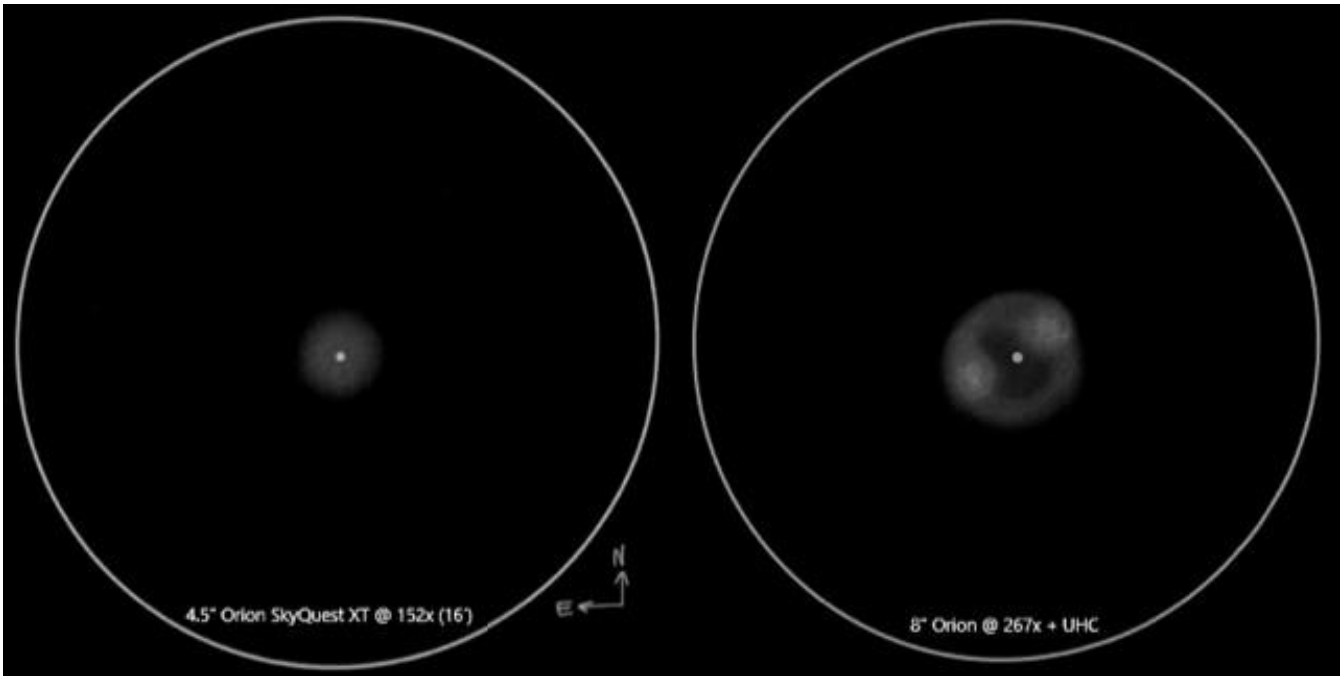
My final attempt at viewing the Crystal Ball Nebula came on the evening of January 6, 2019, when the transparency was a good 3/5, but a steady NW wind at 14mph with 30mph gusts kept the seeing tanked at 1/5. Working with a 10-inch F/5 Newtonian and a 12mm eyepiece equipped with an OIII filter, I found the nebulosity to be quite evident with direct vision and even better with averted vision. While I didn't detect the structure that lends this nebula its 'Crystal Ball' moniker, I did see a definite annulus structure, with the outer areas much denser than the area in near the central star(s).



Jaakko Saloranta: Observer from Finland

Under a suburban sky (SQM-L: 18.30 @ zenith) using a 4.5-inch reflector @152× (16'), this planetary appeared as a fairly faint, round nebulous atmosphere surrounding an unusually bright mag. 10 central star.

Under urban night sky (SQM-L reading: 20.47 @ zenith) and using an 8-inch reflector at 267× with a UHC filter, NGC 1514 had a brilliant mag. 10 central star visible and being slightly off-centered to the north. The entire nebula was mostly round, but also irregular in shape. The ring structure was easily visible. I saw brightening in the NW and SE part of the halo.



Richard Nugent: Observer from Massachusetts

I recently observed NGC 1514, The Crystal Ball Nebula, or as James Mullaney suggests, "Herschel's Revelation."

It's always fun to be able to glimpse the central star of a planetary nebula! While there are many examples where these stars are easy—NGC 6826, the Blinking Planetary, for instance—there are many, like the central star of M57 that are notoriously difficult. I had never observed NGC 1514 until this month, so imagine my astonishment at seeing the brilliant (mag. 9.4) central star! How could this star appear so bright from its distance of nearly 1,000 light-years? A quick search of the Internet offered several journal articles that provided an answer. The central star of this object appears to be a binary system consisting of an A-type giant star and the unseen progenitor star! The hot progenitor star is only revealed through spectroscopic analysis. We see the bright, cooler star which, considering its evolutionary state, cannot be responsible for the formation of the nebula nor its illumination.

I observed this wonderful object from my home (NELM 4.8 on an average night) using my 20-inch and 10-inch telescopes. I used a variety of magnifications, with and without UHC and OIII filters.

The central star is straddled by two mag. 8 stars, HD 26104 and HD 26125, separated by nearly 17'. This makes locating the object easy. If the nebulosity isn't revealed immediately, use a filter.

Using the 20-inch, this object was magnificent! At magnifications of 148× and 194×, I could see the nebulosity, but this object really burst to life when I slid the UHC filter into place! The nebulosity was quite round, with a well-defined edge. Using the OIII filter revealed the dark

hollows of the nebula. No averted vision was necessary. The brilliance of the central star, with the delicately subtle nebula, made it hard to move on to the next object!

The night I used the 10-inch scope, the sky conditions were deteriorating quickly. After an hour, low, thick clouds moved in from the east, ending the observations for the evening. Using this scope, seeing the nebula without filters was challenging. Only with a magnification of 170× could I glimpse the nebula, and then, only with averted vision. The best view through this scope came while at 109× (exit pupil of 2.3 mm), using the OIII filter with averted vision. I noted the nebula was very large and bright, with a well-defined edge. Again, the central star blazed brightly.

Out of curiosity, I attached my 90mm aperture mask. Now, the view was quite different! The OIII filter passes so little light that I could barely see the central star, and to make matters worse, I could not see the stars well enough to know when the scope was focused. Of course, I could see no nebulosity. The moral of this story? OIII filters require aperture to "push" enough light through the filter. It's been my experience that they work best in apertures of 10-inches and above. For smaller apertures, I use a gentler filter, like The "Skyglow."

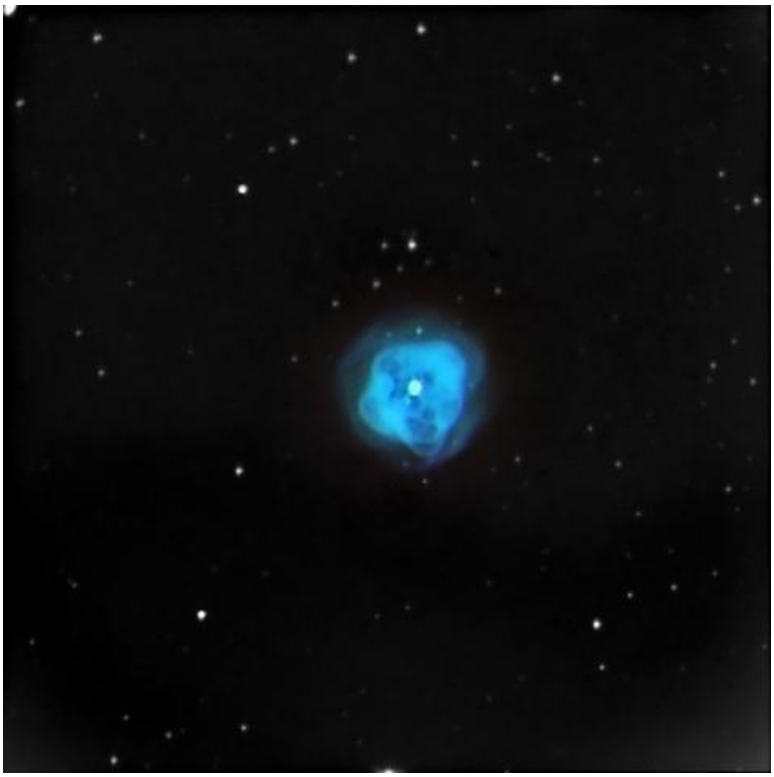
When you start observing new objects, you never know when you'll be pleasantly surprised by the view. For me, NGC 1514 was one of those objects, and it's now a permanent member of my fall-winter observing lists!

Mario Motta: Observer from Massachusetts

I imaged NGC 1514 and used narrow band filters as the moon was out, 15 min subs, 1.5 hour each Ha, and OIII filter, and 30 min S2 (no sulfur in the nebula, used for star color balance), with my 32-inch f/6, SBIG STL1001E camera.

Had hard time balancing color.

Interesting planetary with lots of detail.



Jay Thompson: Observer from Nevada

With a 16-inch SCT and no filter, from our backyard in Henderson, NV, NGC 1514 was washed out by the background sky glow. At 156×, and with a UHC-type nebula filter, it appeared as a haze around a bright central star.

We also observed it from the dark desert skies of Meadview, AZ with 17-inch and 24-inch Newtonian reflectors. With the 17-inch, it was apparent at 227× with no filter.

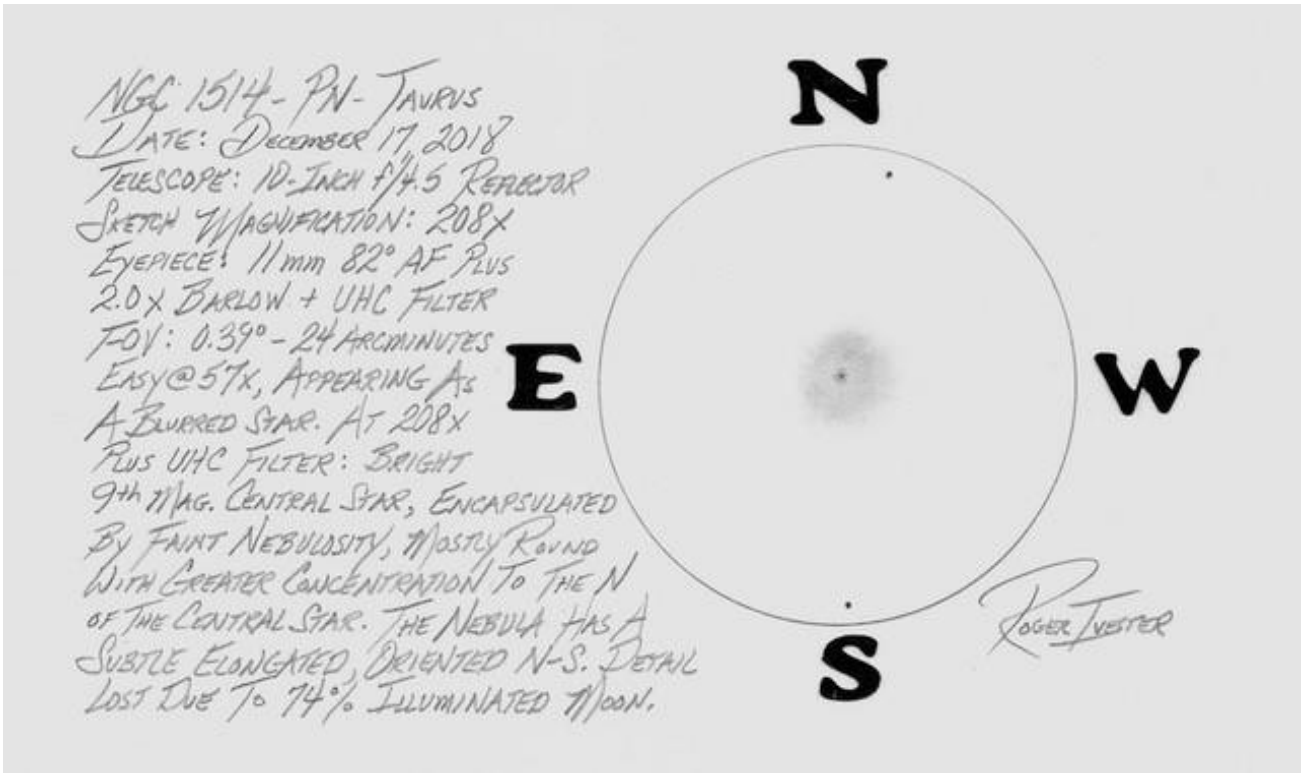
We saw the central star with the relatively faint nebular disk around it.

Through the 24-inch at 116×, it was recognizable as a haze around a fairly bright star. At 277×, we noted that the central star was very much brighter than the surrounding nebula. With averted vision, we saw some inhomogeneity in the nebular disk.

Roger Ivester: Observer from North Carolina

On December 17, 2018, I observed NGC 1514 at 208× using a 10-inch Newtonian, an 11mm EP with an 82° AF, a 2X Barlow & a UHC filter. The seeing was excellent, however, with a 74% illuminated moon. I set my reflector in the backyard, using my house to shield the direct light from the moon. Having no idea what to expect under these conditions, I started out with 57×, and without a filter. It was easy to see the mag. 9 central star, with some faint surrounding nebulosity. I then went to 208× and a UHC filter, and the nebula really came alive!

The only two stars visible in the field, were two mag. ~8 stars. One was to the north and the other south. The nebula had greater concentration to the north, which can be seen in my sketch. The edges were irregular and uneven, and the nebula had a very subtle N-S elongation.


NGC 1514 - PN - Taurus
Date: December 17, 2018
Telescope: 10-Inch f/4.5 Reflector
Sketch Magnification: 208x
Eyepiece: 11mm 82° AF Plus
2.0x Barlow + UHC Filter
FOV: 0.39° - 24 Arcminutes
Easy@57x, Appearing As
A Blurred Star. At 208x
Plus UHC Filter: Bright
9th Mag. Central Star, Encapsulated
By Faint Nebulosity, Mostly Round
With Greater Concentration To The N
of The Central Star. The Nebula Has A
Subtle Elongated, Oriented N-S. Detail
Lost Due To 74% Illuminated Moon.
N
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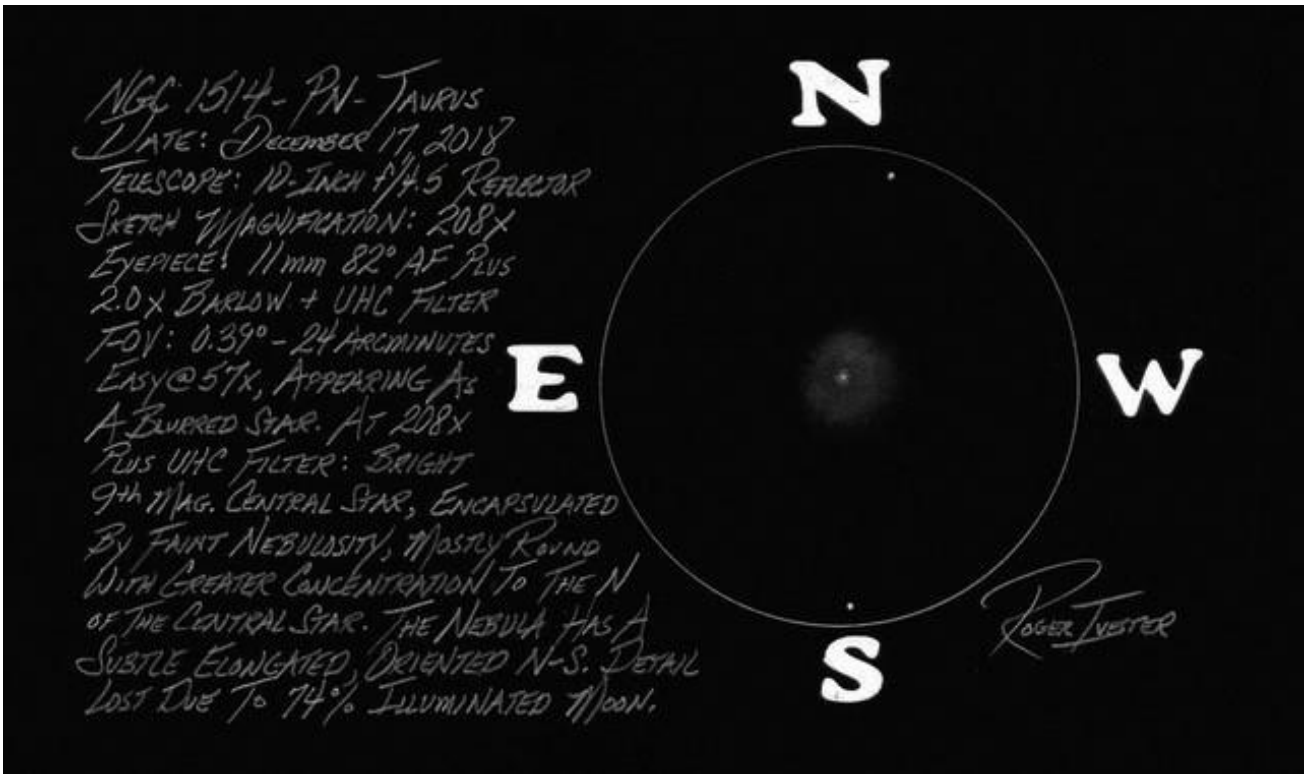
Roger Ivester


NGC 1514 - PN - Taurus
Date: December 17, 2018
Telescope: 10-Inch f/4.5 Reflector
Sketch Magnification: 208x
Eyepiece: 11mm 82° AF Plus
2.0x Barlow + UHC Filter
FOV: 0.39° - 24 Arcminutes
Easy@57x, Appearing As
A Blurred Star. At 208x
Plus UHC Filter: Bright
9th Mag. Central Star, Encapsulated
By Faint Nebulosity, Mostly Round
With Greater Concentration To The N
of The Central Star. The Nebula Has A
Subtle Elongated, Oriented N-S. Detail
Lost Due To 74% Illuminated Moon.
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Fred Rayworth: LVAS AL Coordinator and Observer from Nevada

I've viewed the Crystal Ball Nebula, NGC 1514 twice, but wasn't able to squeeze out a more current observation for the Challenge. Suffice to say, I was competent enough to at least get a few chicken scratches in my log book that I was able to convert into a much better (hopefully) drawing, as noted below.

The first time I observed it was on December 10, 2004, using my home-built 16-inch f/6.4 from Sunset Overview at Lake Mead at an altitude of 1,375 feet. It was calm, cool, but not cold. There was no breeze. Humidity might have been a problem, especially with transparency. Over the night, we had some high haze and low fog. It *did* affect viewing.

NGC 1514 was extremely faint at 72×. I had to use the OIII filter to find it, then I could barely see it when I took the filter off. It was then a very faint haze with a bright central star. I tried an 18mm (132×), but it didn't help much.

The second time I observed it was using my 16-inch f/4.5 a decade later on October 25, 2014 from Furnace Creek Ranch in Death Valley at -190 feet. It was extremely windy, with high, thin clouds. The winds were supposed to die down at dusk, but they actually got worse. The clouds finally went away after dark but the winds brought in lots of turbulence and dust. Seeing was terrible, and transparency? Forget it. However, I finally got a few faint fuzzies, including two Herschels. That was it. Still enjoyed the night. The ironic thing was that the winds died at midnight, but the sky disappeared at the same time. Go figure.

One of those fuzzies I got was NGC 1514. It was a nice puff of nebulosity at 102×, round and mottled around a very bright central star. I never would've found it without the OIII filter. Without it, the star just looked regular with a slight discoloring that didn't stand out from the gray-black background of the other nearby stars. It was best at 102× with the OIII, though I

tried at 131× as well. The nebulosity was lumpy and mottled and it looked like a lot was going on in that area, but the sky conditions prevented me from seeing more detail with more magnification.