MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

Compiled by:

Roger Ivester, Boiling Springs, North Carolina

&

Fred Rayworth, Las Vegas, Nevada

With special assistance from:

Rob Lambert, Las Vegas, Nevada

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NGC-2264 The Christmas Tree Cluster/Cone Nebula

Introduction

The purpose of the observer's challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, we will be happy to include them in our monthly summary. Observing is not only a pleasure, but an art. With the main focus of amateur astronomy on astrophotography, many times people tend to forget how it was in the days before cameras, clock drives, and GOTO. Astronomy depended on what was seen through the eyepiece. Not only did it satisfy an innate curiosity, but it allowed the first astronomers 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 is the tradition we are stressing in the observers challenge. By combining our visual observations with our drawings, and sometimes, astrophotography (from those with the equipment and talent to do so), we get a unique understanding of what it is like to look through an eyepiece, and to see what is really there. The hope is that you will read through these notes and become inspired to take more time at the eyepiece studying each object, and looking for those subtle details that you might never have noticed before. Each new discovery increases one's appreciation of the skies above us. It is our firm belief that careful observing can improve your visual acuity to a much higher level that just might allow you to add inches to your telescope. Please consider this at your next observing session, as you can learn to make details jump out. It is also a thrill to point out details a new observer wouldn't even know to look for in that very faint galaxy, star cluster, nebula, or planet.

NGC-2264 The Christmas Tree Cluster/Cone Nebula

The Christmas Tree Cluster is an easy object for any telescope. Shaped like a V and named the Christmas Tree Cluster by one L.S. Copeland, it is a loose scattering of between 20 and 60 stars, depending on the scope size, your observing skills, and maybe a little imagination. Easily seen in even a 60mm (2.4-inch) refractor, it can look like the namesake Christmas Tree, or just a loose uneven clump of stars. The tricky part is seeing the nebulosity. As shown in long-exposure photographs, the area is a hotbed of nebulosity, with several significantly large patches in and around the area of the cluster. One such is the Fox Fir Nebula, which is also known as Sharpless 273, and is the nebulosity usually seen visually in 10-inch and larger telescopes. However, the most interesting nebulosity comes at the other side of the cluster. Known as the Cone Nebula, it's a dark V-shaped region lit up by a faint background glow. It's an extreme challenge to see visually through anything but the largest backyard telescopes, yet it's relatively easy to photograph.

Observations/Drawings/Photos

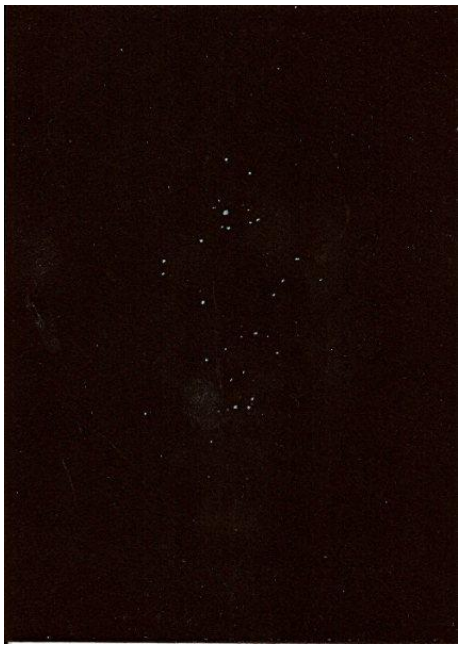
Roger Ivester: Observer from North Carolina

I observed this cluster on two different nights during January, using my 10-inch f/4.5 Newtonian, with both seeing and transparency being rated as excellent. Open cluster NGC-2264 appeared mostly sparse and coarse with a triangular shape and a dimension of approximately 1/2°.

The associated faint and mostly irregularly shaped nebulosity was fairly easy to see at low magnification. I used a variety of eyepieces, and magnifications, including a nebula filter in an attempt to see the classic cone shape, but to no avail.

It's my opinion that the Cone Nebula is best suited for a very large scope under dark skies. However, the image as presented in photographs, is not likely to be seen visually in most backyard scopes.

The sketch of NGC-2264 and faint nebulosity was made using my 10-inch f/4.5 reflector at 57X, using a white charcoal pencil on black drawing paper. The field of view of the cluster and nebulosity was 70 arc minutes, or 1.14°. All observations were made from my moderately light polluted backyard located in Boiling Springs, North Carolina.

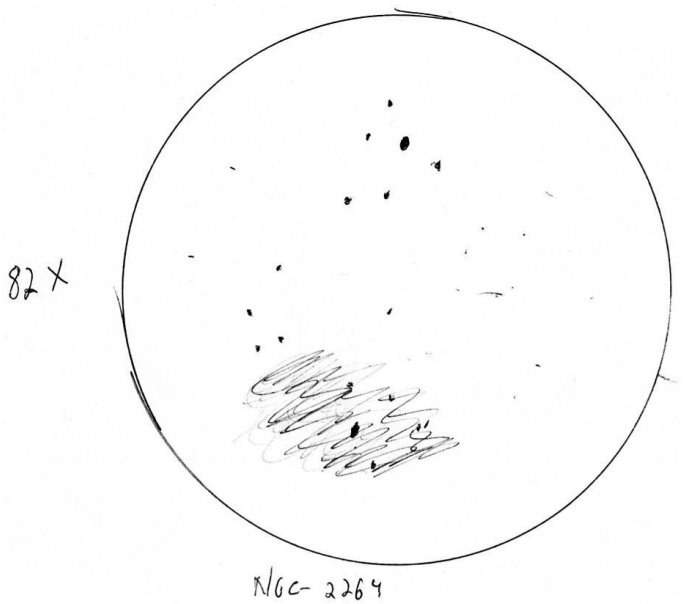


Fred Rayworth: Observer from Nevada

I wasn't able to observe the object this month, but kept a log of all my observations and had plenty of samples to choose from. My descriptions go back to when I was still using my home-built 16-inch f/6.4 Dobsonian and a 32mm eyepiece for 82X. On October 16, 1993, I saw a loose group surrounded by a slight haze. On March 20, 2004, I saw a bright star surrounded by a halo along with a scattering of stars with no definable shape. On February 9, 2008, I saw an uneven bright clump.

I have never noted the Christmas Tree shape, and that may be because my scope was too large and showed more background stars, making the namesake shape blend into the mass of other stars. The cluster looked more like an uneven clump to me and I've noted 20 to 40 stars, depending on the night.

Never have I seen the cone shape, though I've noted the Fox Fir nebula (Sharpless 273). The next time I have a chance, I'm going to try my O-III and H-Beta filters, plus a variety of magnifications to see if I can bring out the cone. I've done one drawing that's representative of what I usually saw.



Rob Lambert: Observer from Nevada

My opportunity to observe NGC-2264 and the Cone Nebula came while at the semi-annual LVAS star party in Death Valley on 15 and 16 January, 2010. Initially, the weather didn't look very promising for either night of observing. Friday night was a total washout with high thin clouds across the entire sky and patchy thick clouds that completely blocked out at least 75% of the sky. It wasn't even worth setting up the scopes. Saturday night was much better as a 13-hour window of clear skies opened up Saturday just after noon and held until about 1:30 Sunday morning.

NGC-2264 had just passed the meridian by the time the park visitors departed, and I was able to observe, so it was presented well in the sky. At first, I located the cluster with my 4.7-inch refractor. On the color CRT monitor, the Mallincam displayed a beautiful image of the Christmas Tree, and the Cone Nebula was just visible as little dark notch pointing toward the star at the top of the tree. I was able to see nebulosity in two areas, both primarily around the brighter stars of the cluster, 15 Monocerotis and TYC750-1719-1. The nebulosity appeared to stretch the entire length of the cluster, but was less bright in the middle.

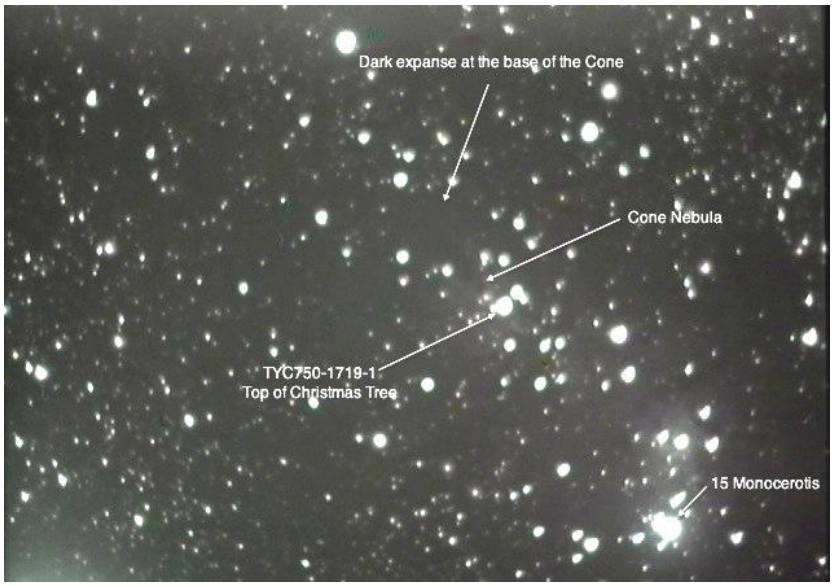
Fearful that I'd lose the ability to observe the Cone Nebula with the approaching clouds, I centered the tip of the Cone on the CRT and moved the Mallincam down to the 10-inch SCT to try for a closer detailed view. I was thrilled to see the Cone, with a bubble at the top containing three stars, centered on the screen. My alignment of the two scopes with each other had been nearly dead-on. In the image, the bubble is centered south (below and right) of TYC750-1719-1. The Cone widens as it stretches out toward the south. On the CRT, the Cone had tinges of red along its length and was dark and void of any light or color in its interior, except for what I thought were a few dim foreground stars. The bubble at the top of the Cone was pink and translucent. Three stars seemed to be trapped in whatever material shaped the bubble. The captured image didn't provide anywhere near the detail or clarity that I saw on the CRT, but the Cone can be seen as a darker wedge extending down and right from TYC750-1719-1. There's an almost straight chain of four stars that extends northeast (down and left) away from the tree-topper stars in the close-up of the Cone Nebula.

I went back to the 4.7-inch refractor to capture an image of the Christmas Tree Cluster. By this time, some high haze had moved in, lessening the detail that I had seen earlier, but the cluster and its nebulosities were still clearly visible. A faint nebulosity covered the entire cluster,

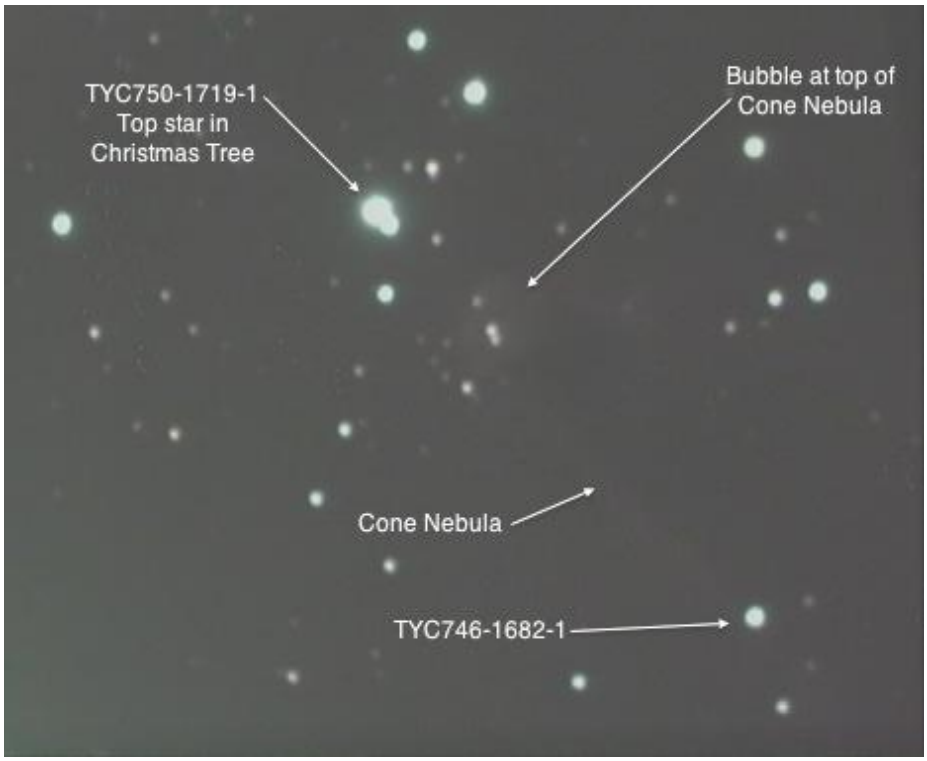
but a much brighter patch of nebulosity was associated with 15 Monocerotis and the stars on the southwest side. It surrounded the bright star and extended southwest, up into the right side of the tree. Seeing the nebulosity associated with this cluster reminded him of coming from the outside cold into my dark family room that was being lit by only the lights of the Christmas tree. When first seeing my tree in this light, there seemed to be a haze around each of the lights, and so it was with the stars in the Christmas Tree Cluster. This haze lessened significantly toward the center of the tree and then began to brighten again as you approached the star at the top. The star topping the Christmas Tree seemed to actually be two stars, TYC750-1719-1 and USNO-J064-1098+092751, which pointed to the bubble at the top of the Cone Nebula. Within the cluster, I counted at least 20 brighter stars and there had to be at least 3 or 4 times that many dimmer stars in the cluster. The Cone Nebula was centered in the wide-field image of NGC 2264, pointing down into the cluster. You could just see the stars that reside in Cone's bubble. The dark void of the Cone widened and became an obvious dark hole surrounded by some brighter stars southeast of the top of the tree.

Although I don't believe my images do justice to what I saw on the monitor (I needs to work on improving the capture process), this was an exciting challenge. I was able to see the Cone Nebula, an object that I would never be able to see at the eyepiece with my less than perfect eyes. I hope to revisit this challenge on my next outing.

Note: Rather than try to flip the images so that they matched in orientation, I decided to leave them as I saw them on the monitor. The image of the Christmas Tree Cluster was captured with the 4.7-inch refractor with the Mallincam at full gain and 15-sec integration.

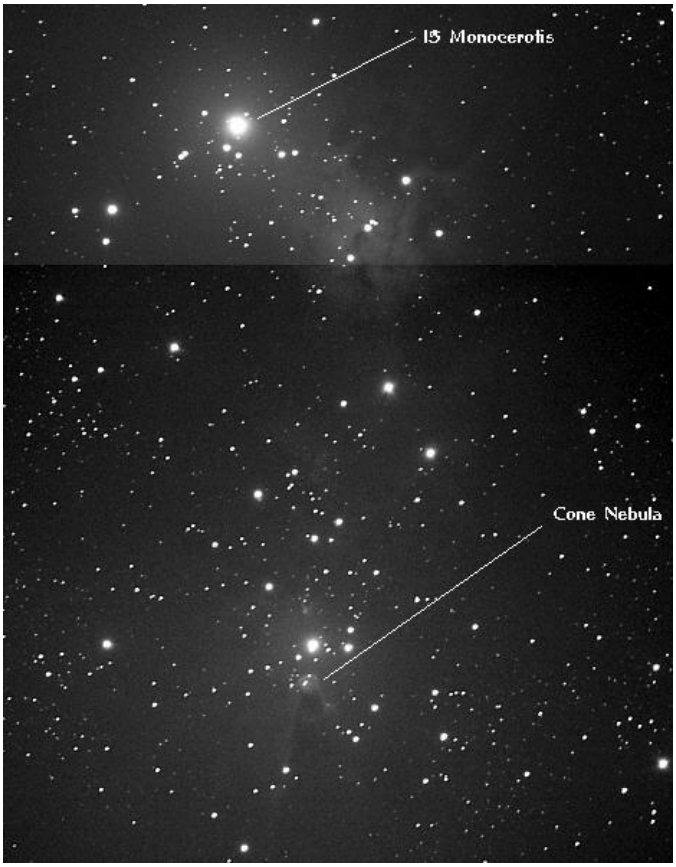


The image of the Cone Nebula was captured with the 10-inch SCT with the Mallincam at full gain and 30-sec integration. Both images were stacked from 2 single frames and 1 dark frame to remove hot pixels only. No other post processing was done. The stacking software will not process a single light frame and a single dark frame. It must have at least two light frames to process.


TYC750-1719-1
Top star in
Christmas Tree
Bubble at top of
Cone Nebula
Cone Nebula
TYC746-1682-1

Dave Blanchette: Observer from Nevada

This was the first time I've ever looked at the two objects in NGC 2264. Therefore, I had some trouble figuring out where to shoot the image. So, the image is a combination of two 10 minute images, converted to grayscale for clarity. It was late and there were clouds rolling in, so these were the last images I shot for the night.



Dr. James Dire: Observer from North Carolina

NGC-2264 is usually the designation given for a star cluster in the constellation Monoceros (mono – one, ceros – horn; The Unicorn) which is embedded in a large nebula. The nebula spans approximately 1º of declination and 1/2º right ascension. If north is up, the nebula is in the shape of an inverted cone or Christmas tree. Thus NGC-2264 is sometimes called the Cone Nebula or Christmas Tree Nebula. Near the south end of the nebula, or the apex of the cone, lies a dark nebula, also cone shaped, with the apex on the north end. This dark nebula is called the Dark Cone Nebula.

The actual star cluster is approximately 39 arc minutes in diameter. My image of the Cone Nebula is centered on the star cluster, and only captures about half of the bright nebula. This image was taken with a 190mm (7.5-inch) f5.3 Maksutov-Newtonian Astrograph using an SBIG ST-2000XCM CCD camera. It's a composite of six 10-minute frames taken on February 23, 2009. I have captured roughly the bottom half (north side) of the Christmas Tree (remember it's upside down).