

MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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&

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NGC-2261 (Caldwell 46) Hubble's Variable 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-2261 (Caldwell 46) Hubble's Variable Nebula

NGC-2261, otherwise known as Hubble's Variable Nebula, is a variable nebula in Monoceros. Originally discovered by William Herschel in 1783, it didn't get its name until January 26, 1949, dubbed so by Edwin Hubble. Herschel had described it as comet-like but Hubble, after studying it extensively, noticed that its shape and brightness varied over time due to the variable star in its "comet head" known as R Monocerotis, which was discovered to be variable in 1861. Over the years, he was able to photograph it and by the time of the opening of the Palomar observatory, he confirmed the nebula's variability and thus named it after himself. With a rough magnitude of 9.0, it is fairly easy to spot in even smaller scopes. Of course, the larger the scope, the more details will emerge.

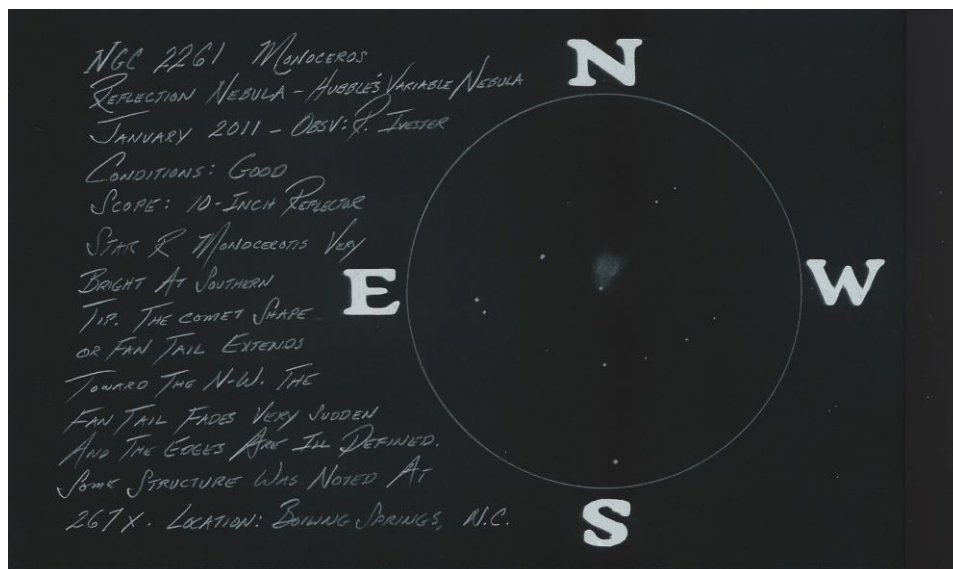
Observations/Drawings/Photos

Roger Ivester: Observer from North Carolina



The Challenge object for February 2011 is NGC-2261, a most unique reflection nebula that's also known as "Hubble's Variable Nebula." It's located in the constellation of Monoceros. All observations were made using my 10-inch f/4.5 reflector telescope from my moderately light-polluted backyard located in Boiling Springs, North Carolina. The 10-inch presents NGC-2261 as fairly small with high surface brightness which allows the use of high magnification if seeing is good enough.

The illuminating star, R Monocerotis was positioned at the apex of the extreme southern tip of the nebula. The shape of the nebula was triangular with a wide fan shaped tail pointed toward the NNW. I saw the nebula easily at low power, but high magnification was necessary to see the faint and interesting details. When I increased the magnification to 267X, I noted structure. I saw a brighter section just north of R Mon, and noted some greater concentration following the western edge and also along the NE edge. The broad fan tail faded very suddenly and the NE side made an obvious curve toward the NW.



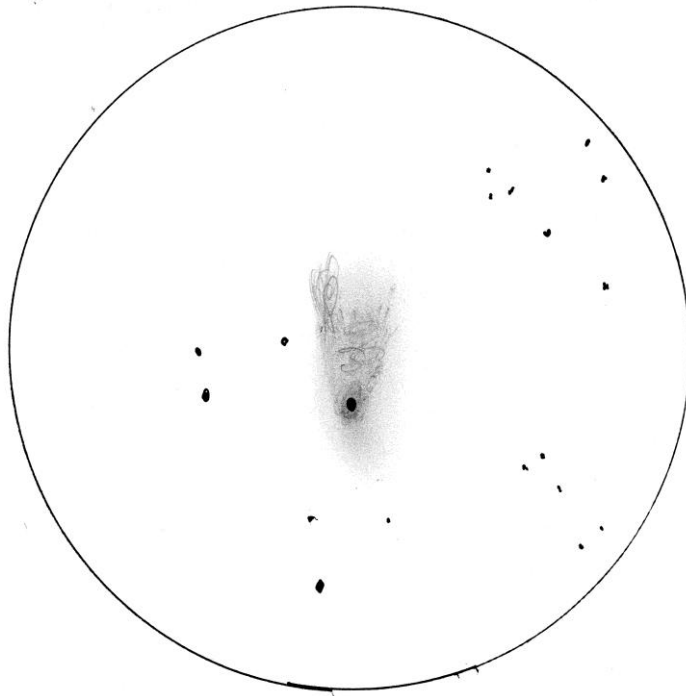
Fred Rayworth: Observer from Nevada



I've observed NGC-2261 many times over the years but had the latest opportunity at Death Valley in January, 2011. The night was calm and clear and the temperature chilly, but tolerable. As usual, I immediately spotted a nice fan shape, reminding me of a stubby comet with a very bright head to it. The O-III filter didn't help. In fact, the filter washed it out considerably. At first I thought the nebula looked best at 86X. However, after careful study, the finer details came out at 229X. I noticed mottling that faded toward the end of the fan and was more concentrated near the head. That mottling also seemed to favor one side of the fan more than the other. I didn't really notice any color other than maybe a hint of blue within the mostly gray haze. Those details were easier to see at 229X but the nebula was also a bit dimmer overall and lost a bit of its visual impact.

NGC-2261

229X



Rob Lambert: Observer from Nevada



At first look, the nebula appeared to be somewhat like an irregular comet, with a bright core and a small halo at its head. Its tail quickly blossomed into an asymmetrical fan that faded into thin wisps as it moved northward from the apparent comet's head. Although much of the reference material I've read about NGC-2261 mentions that it was first mistaken to be a comet, none of it suggested calling it the Comet Nebula, in addition to Hubble's Variable Nebula.

The star R Monocerotis was very apparent behind the nebula, located at what one might call the apex of the fan. As the fan moved away from the star and spread out, it appeared to be drifting smoke. I'm anxious to observe it again and see if I can observe the variability in the fan's structure and brightness. The wisps of dust gave the nebula a sense of depth and movement even in my 2-dimensional image. There were several stars that peeked through the thinner veils of the nebula, especially near the wider more translucent end.

I compared my image with one of similar orientation taken from the Hubble Space Telescope in 1999 and I discovered that the dark area in the upper center of the fan was indeed shaped differently. That area in the HST image was more elongated north and south than in my own image. There was also a more distinct brighter region between the dark area and the apex of the fan.

This is truly a fascinating object - one to which I will return to quite often, so that I might see the changes in variability for myself.

My image of NGC-2261 is a single frame, unprocessed, that was taken at Death Valley right before the clouds moved in on the last night there in January. It had been my intent to revisit this object during the month of February, but time and sky conditions just didn't allow it. The image was captured with my 10-inch SCT using a Mallicam VSS video camera, with a Mallincam MFR-3 focal reducer and 25mm of spacers between the focal reducer and the CCD sensor. This resulted in a focal ratio of f/5 with a magnification of approximately 160X. Integration/exposure time was 45 seconds with the automatic gain control set at 6. This was an unguided capture on the SCT's normal alt-az fork mount, thus the slight trailing of stars during the 45 second exposure.

I've included the HST image, so that you might be able to compare their images with it.



Buddy L. Barbee: Observer from North Carolina



My observation was made Tuesday, March 1, 2011 from my club's field near Pilot Mountain, NC. I was using the 10-inch Dobsonian and a 7mm eyepiece for a magnification of 171X. It was a cool 40° F with a calm wind and low humidity. The sky was beautiful that night, having a naked eye limiting magnitude of 5.8.

With the weather and all that has been going on in my life, I have not had a chance to get out to a dark site and observe any in a while. Friday, February 25 was a great night but I had other commitments. So, when the weather cleared up Tuesday, I decided to head out to the club field and give it a go. I sat up the 10-inch Dobsonian, hoping it would stay clear long enough to draw NGC-2261, and it did. After finding NGC-2264, the Christmas Tree Cluster in my finder scope, I star-hopped from NGC-2264 using a 24mm eyepiece (for a magnification of 50X) and moved southwest approximately one field-of-view. I was a little surprised that it was easily seen at that magnification. It looked like a small but bright gray spot that was twice as long as it was wide at that magnification. Centering the object in the field-of-view, I upped the magnification to 171X with a 7mm eyepiece. The nebula looked like a fan with a small bright star in the south end. The fan shape grew wider the further north it went and appeared to curve in a westward direction until it ended with an irregular edge along the northern edge. This nebula was much brighter than I expected it to be.

As I finished my sketch, looking up I noticed that the forecast haze was quickly moving in. So, it was a race to see a few more objects before all observing was lost for the night.

DEEP-SKY OBSERVATION FORM

CONSTELLATION:

Monoceros

OBJECT:

NGC 2261
Hubble's Variable Nebula



Day & Date: Tue, March 1, 2011
Time (local): 8:05 PM EST
Time (UT): _____
Observer: BLB
Location: Club field

Seeing (1-5): 3
Transparency (1-7): 4
NELM: 5.8
Temp: 40°F Wind: 0-3 mph
Humidity: 39%

INSTRUMENT

Telescope: 10" Dob
Aperture: 254 mm
Focal Length/Ratio: f/4.7
Eyepiece: 7 mm
Magnification: 171x
Field-of-View: 00° 21'
Filter: None

OBJECT

RA: 06 hr. 39.2 min.
Dec: +08 d. 44.6 min.
Type: Bright Nebula
Listed Magnitude: -
Listed Size: 2' x 1'
Altitude of object: 60° ±

NOTES

I found NGC 2261 with a 24mm eyepiece at 50x by moving SE one field-of-view from NGC 2264 - it appeared as a small bright gray smudge that is twice as long as wide in a north-south direction

With 7 mm eyepiece at 171x it looks like a small fan with a dim star in the narrow southern end, almost comet like in shape.

Jim Gianoulakis: Observer from Nevada



This object is a curious reflection nebula located in the constellation of Monoceros. People have remarked that the nebula resembles the head of a match that has just ignited. William Herschel discovered this fan shaped glow in 1783. In 1916 the American astronomer, Edwin Hubble, while comparing a series of pictures of the object noticed that the shape and brightness of the nebula varied over weeks and months. The object came to be known as Hubble's Variable Nebula. The nebula contains R Monoceros, a mag. 10 star at the southern tip of the fan. One would presume that this obvious star would be the source of illumination for the reflection nebula but it's not. As it turns out, the mag. 10 knot we see with our telescopes as R Monoceros is actually a cocoon of dust being illuminated from within. What we see as R Monoceros is actually a binary star system, 2,500 light years distant. The primary star is a hot beta type star, ten times the mass of our sun. The secondary star is 200 times fainter. Each star is buried in a cloud of dust too small to be resolved by even the HST. The star that illuminates the nebula is only visible in deep infrared wavelengths. This binary pair's apparent magnitude cycles from approximately mag. 9.5 to mag. 13. Latest investigations of this object indicate that the fan shaped nebula is actually a cone, hollowed out by a jet of hot gas flowing out of the primary star's disk.

About the photo: The camera used was an Orion StarShoot Pro V2 OSC shot through an 8-inch RC scope mounted on an Orion Atlas Eq-G mount. The exposures were 14 lights (20 min) calibrated with darks, flats and bias frames.

