MONTHLY OBSERVER'S CHALLENGE

Compiled by:

Roger Ivester, North Carolina

&

Sue French, New York

February 2020

Report #133

NGC 1931 Nebula & Cluster in Auriga

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 who's interested, and if you're able to contribute notes, and/or drawings, we'll be happy to include them in our monthly summary. 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 astronomers 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 Observer's Challenge. And for folks with an interest in astrophotography, your digital 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 1931 Nebula and Cluster in Auriga

NGC 1931 is a small emission and reflection nebula with an involved cluster. The brightest part of the nebula has a trapezium system at its heart. Somewhat at odds with their name, trapezium systems can consist of more than four stars, and they don't have to be arrayed in a trapezoidal shape. The term was initially coined to mean "a multiple star system whose pairwise separations are of the same order." Some later researchers include groups whose stars may not be gravitationally bound. NGC 1931 is roughly 7500 light-years away from us.

William Herschel discovered this NGC 1931 in 1793. His journal entry reads, "Very bright, irregularly round, about 4 or 5′ diameter. Seems to have one or two stars in the middle or an irregular nucleus. The chevelure diminishes very gradually."

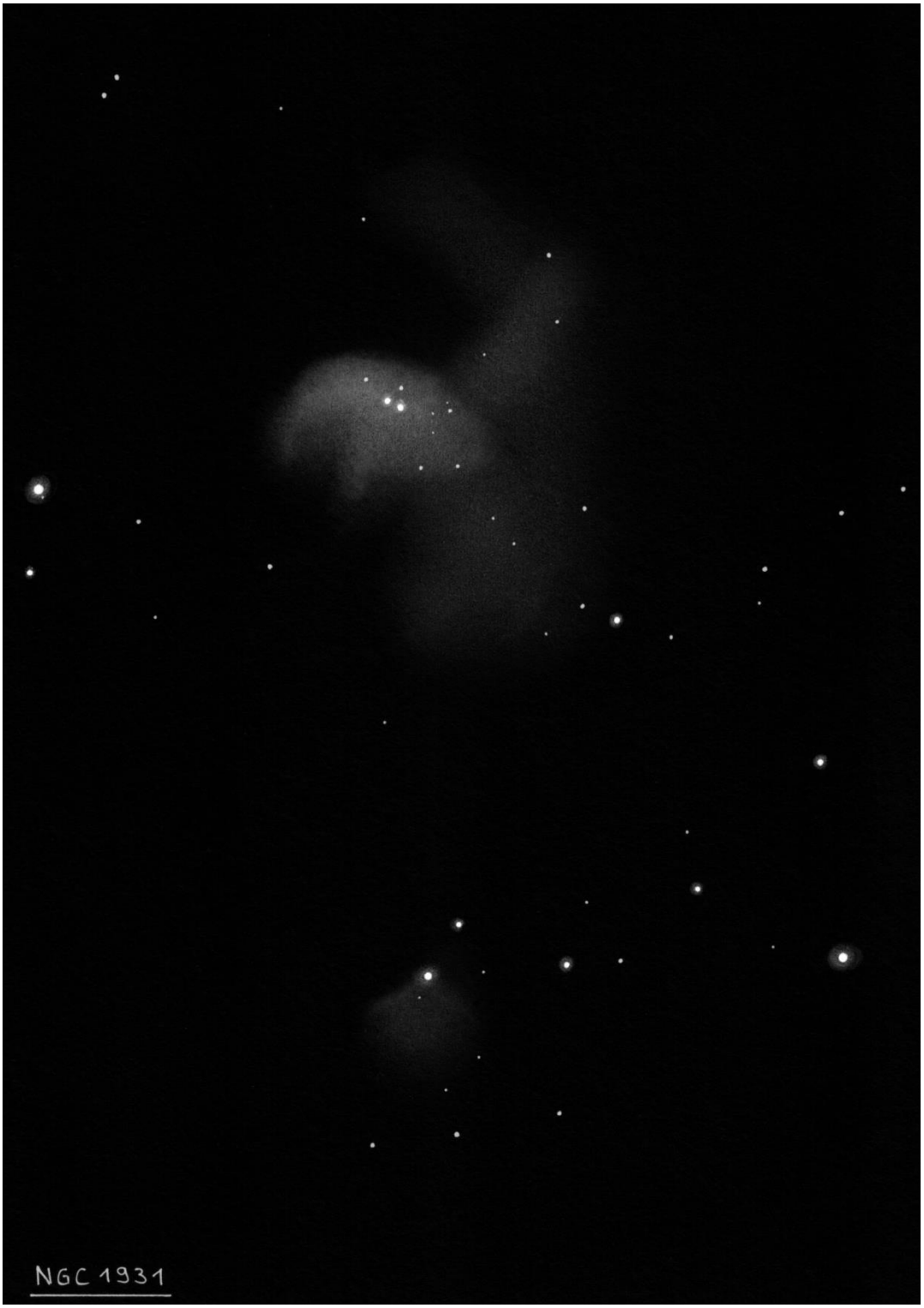
Uwe Glahn: Observer from Germany

We welcome our newest participant, Uwe Glahn of Germany:

Uwe Glahn is an accomplished German observer whose sketches are a joy to behold. They appear in many publications, including my own articles. In the Interstellarum Deep Sky Guide alone, there 821 sketches penciled by Uwe and co-author Ronald Stoyan. You can view Uwe's remarkable sketches on his website **http://www.deepsky-visuell.de/** and learn more about his technique, telescopes, and achievements by putting that URL in Google translate **https://translate.google.com/** – Sue French

See Uwe's NGC 1931 sketch on the next page.

Telescope: 27-inch f/4.2Newtonian @ 293×.
Seeing: IV, NELM 7.0^{+}
NGC 1931 and Parsamian 1 (a cometary nebula in southern part of NGC 1931)


NGC 1931

Michael Brown: Observer from Massachusetts

I observed NGC 1931 in my 8″ SCT and 9mm eyepiece, on January 29 and February 23, 2020. The object appeared to me as a small, sparse, open cluster with a surrounding area of nebulosity, with the brightest part of the nebula apparently south of the main cluster. In the center of the nebula is a pair of relatively bright stars, which I was able to see with direct vision (as opposed to averted vision) after studying the object for a few minutes. With averted vision, I was able to see a third star northwest of the pair.

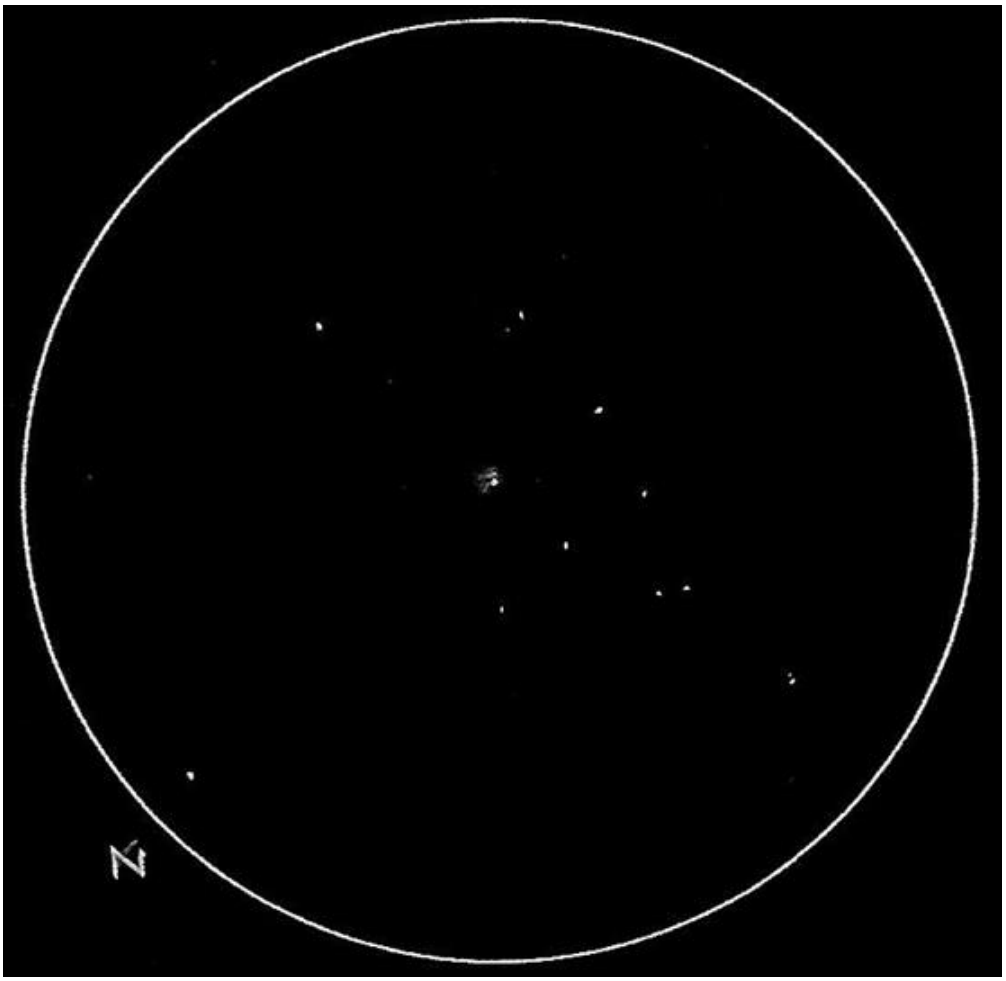
While not the "object of the month," I decided to check out nearby NGC 1893. This is also a cluster and nebula, but much brighter, with an elongated, curved shape.

Joseph Rothchild: Observer from Massachusetts

I observed NGC 1931 in Auriga on February 21, 2020. I observed with my 10-inch reflector under dark skies on Cape Cod. It was best seen with a 14mm eyepiece at 88×.

The cluster was found near Phi Aurigae, between M36 and M38. I saw a loose collection of approximately 10 stars (probably background stars) with one brighter star surrounded by a small area of nebulosity. I did not see multiple stars in the cluster itself, but in retrospect may not have used high enough magnification. Overall, it was much less impressive than its nearby Messier clusters in Auriga, but still interesting to see for the first time.

Glenn Chaple: Observer from Massachusetts



(Above sketch) NGC 1931, as seen with 4.5-inch f/8 reflector at 150×. Field diameter is 0.4 degrees.

NOTES:

On an evening with a magnitude limit of 5 and so-so seeing conditions, I viewed NGC 1931 by star-hopping from 5th magnitude phi (φ) Aurigae. With my 4.5-inch f/8 reflector and a magnifying power of 150×, I could make out what appeared to be a 10th magnitude nebulous "star." A switch to a 10-inch f/5 scope and 208× brightened the nebula and split the star (HJ 367), magnitudes 11 and 12, separation 8 arc-seconds), but atmospheric turbulence prevented me from seeing any other embedded stars.

Vladislav Mlch: Observer from Massachusetts

Date: Jan 20, 2020
Location: White Mountains National forest, New Hampshire
Conditions: Bortle 2, average seeing
Using: 22-inch f/3.3 DOB with a 21mm eyepiece (~88×, FOV~65′), 10mm (~185×, FOV~33′), NV intensifier (~92×, FOV~26′)
Filter: 5nm Hα filter used with NV intensifier

Notes: Stars in the open cluster seems to be forming line and arch patterns (or is it my brain forming them?). Only the core of the nebula could be seen in 21mm and 10mm eyepieces. It looks like elliptical galaxy. When switching to NV intensifier with 5nm Hα filter, I was able to see extended nebulosity around the core, forming U-shaped halo.

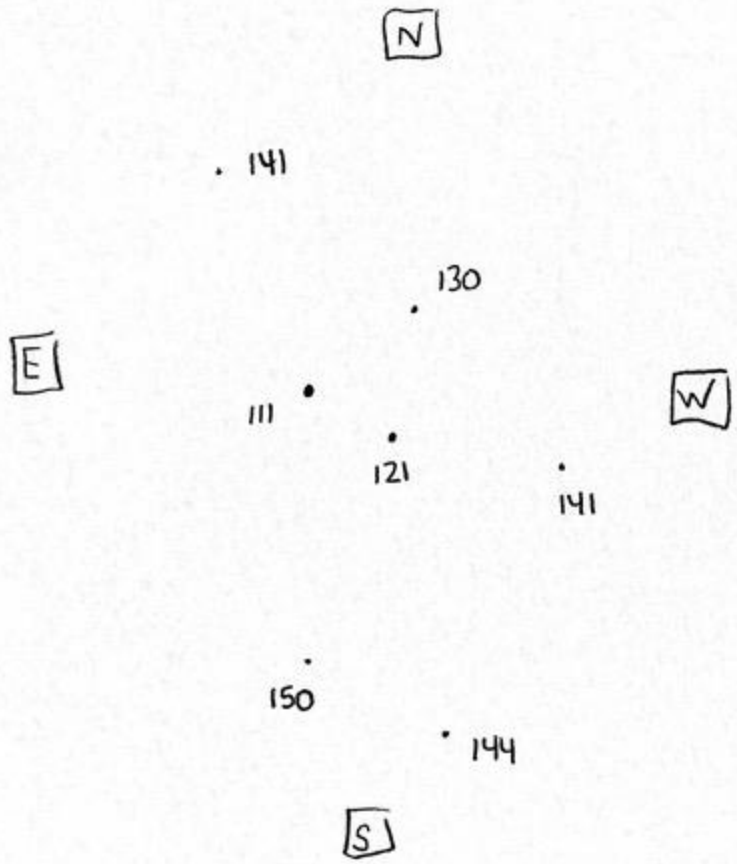

core
extended
nebulosity
NGC 1931

Richard Nugent: Observer from Massachusetts

The nebula is visible through the 10-inch as a small, faint, amorphous glow surrounding a small, nearly equilateral triangle with stars of 11th, 12th, and 13th magnitude. On 28 February 2020, skies were very stable with the 5th and 6th stars of M42's Trapezium visible through the 10-inch scope at 250×. NGC 1931 showed the nebulosity even at 50×; however, the 13th magnitude star of the triangle was only visible at 250× with averted vision.

Earlier in the month, the 20-inch telescope showed the three stars easily, with two 14th magnitude stars straddling the triangle and a slight hint of a nearby 15th magnitude star.

With Steve Clougherty's 18-inch telescope, the 15th magnitude star was visible with averted vision. Through the club's 25-inch scope, that star could be viewed with direct vision. The skies in Westford have about a 0.5-magnitude advantage over those in Framingham.


N
141
130
E
111
W
121
141
150
144
S

Gus Johnson: Observer from Maryland

Could not see NGC 1931 on a clear night with a 5-inch at 24×. I also attempted with an H-beta filter at 30× and a UHC filter, however to no avail. On another night in February 1985, I saw it with an 8-inch reflector @ 40×. Small, fairly bright mostly round nebulosity. Could not see the small trapezium of stars.

Mike McCabe: Observer from Massachusetts

It's been a while since I've participated in the observer's challenge as I've been busy with other projects, so it felt good this past Saturday to prepare my charts and do a little research on the object at hand.

I conducted this observation from Nike Field which is located in Rehoboth, MA. The conditions were pretty good for these parts – maybe a Bortle 5 sky with transparency starting at 3/5 and dropping off to 2/5, and the seeing fluctuated between 2/5 and 3/5 throughout the evening.

I made my observation using a 10″ f/5 Newtonian reflector. NGC 1931 is a tiny emission and reflection nebula that is said to be a miniature version of the Orion Nebula, replete with a trapezium of stars and all.

The target was easy enough to find and showed up right away as a small fuzzy at medium powers, but all my research suggested cranking it up, so I bumped up the magnification to 250× and set down to make my sketch. If there is indeed a trapezium at the center of the nebulosity it was lost on me – the best I could do was what appeared to be three stars, and the nebulosity was there with direct vision but bloomed up nicely with averted vision. The brightest star of the bunch in the .25° TFOV was about magnitude 11 with all others coming in dimmer than that. The size of the object itself spanned no more than about 4′ on the sky, so really quite small.

Observation Log - Object: NGC 1931

Date 2-22-20 /z Time 19:30 /z EST Local Observing Location Rose's Field, Rehoboth

Scope/Aperture 10" F5 Newt

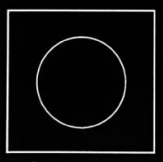
Eyepiece 5mm Magnification 250x, .25° TFOV

Filter X Seeing 2/5 Transparency 2/5

Temp 30°F Baro Pres. X Wind Calm

Comments: ~~Emission/Reflection~~ Neb in Auriga.

Small, dim, nebulosity visible directly but better w/averted vision.



Orientation and/or Rotation

Venu Venugopal: Observer from Massachusetts

Took this picture from the backyard of my home in Chelmsford, MA. 8-second exposures using sharpcap for a short window of 20 minutes before the object was blocked by my roof and trees.

Corey Mooney: Observer from Massachusetts

I live stacked NGC 1931 with my EAA rig on January 29th. I set up at a nearby athletic field in Sudbury MA for better horizons. Once setup, my system could be operated remotely, so I placed my control tablet on the folded-down passenger seat of my car and I was able to comfortably sit, view and control from the back seat while being shielded from most of the elements (still bundled up for the cold).

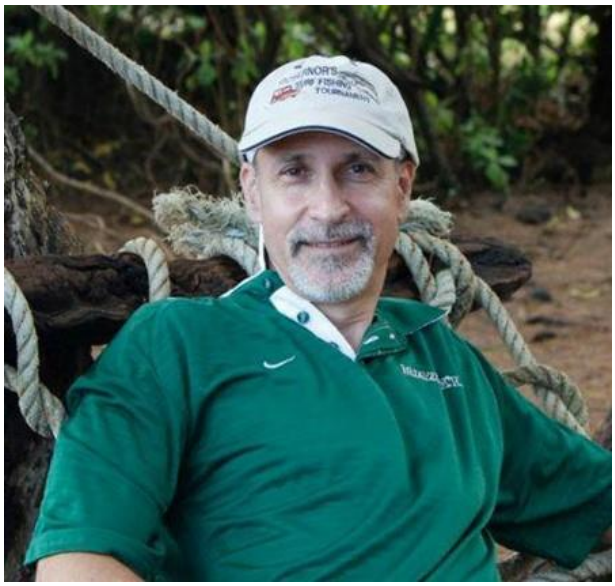
When I slewed to NGC 1931 using short, 2-second exposures, I was able to detect a little bit of nebulosity around the central stars. I zoomed into the live view to look at the stars. I decreased the rolling exposure to 1s, 0.5s then to 0.25s to try and split the SW "trapezium" star. But no luck. It was definitely elongated, but no separation. Maybe a bigger image scale would do it.

After examining the central stars I set the exposure to 8s and began live stacking. As it stacked the red/pink emission nebulosity surrounding the central stars became much more visible. After playing with the histogram stretch the structure of the surrounding gas and dust started to show up. There were darker, opaque areas just to the north and SE of the cluster and there was a faintly rim-lit area farther out to the SW. The faint blue reflection nebula around the mag 11.1 star 3.5′ south of the cluster was also visible; it was much fainter than the emission nebula around the cluster.

NGC1931, 8s × 70 frames = 560s integration (cropped)

Equipment: 208mm f/3.9 Imaging Newtonian, SW Quattro Coma Corrector, ASI294MC-Pro, Super Polaris GEM.

James Dire: Observer from Illinois

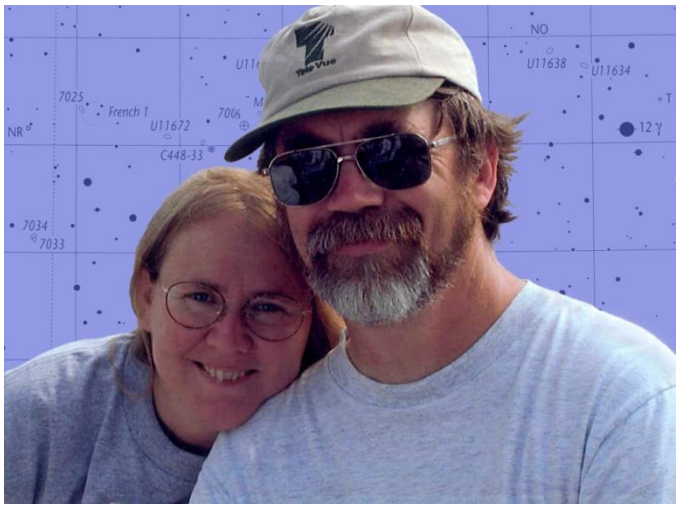


NGC 1931 is a mixed emission and reflection nebula with an embedded star cluster found in the constellation Auriga. The nebula is an active star forming region. The complex is located about one degree west and a tad north of the star cluster M36. NGC 1931 also lies 5.75 degrees north and one degree east of the star Elnath. NGC 1931 measures roughly 3 arcminutes in size and lies 10,000 light years away. The nebula is estimated to be magnitude 10.

NGC 1931 contains myriad young, hot *O* and *B* stars whose radiation is responsible for the blue hues of the reflection nebula. Four stars in the center of the nebula form a trapezium similar to that in the Orion Nebula. Sometimes NGC 1931 is considered a mini version of the Orion Nebula. A much larger vast region of nebulosity known as IC 417 surrounds NGC 1931. The emissions from IC 417 are the characteristic red colors from H II ions.

My image of NGC 1931 was taken with an 8-inch Ritchey–Chrétien telescope operating at f/6.4 with the use of a focal reducer/field flattener. The camera used was an SBIG ST-2000XCM CCD cooled to -20°C. The exposure was 100 minutes. The bright white area in the center contains the trapezium. The exposure was not long enough to bright out the red emissions of IC 417, which would have filled most of the region captured in this image.

Sue French: Observer from New York



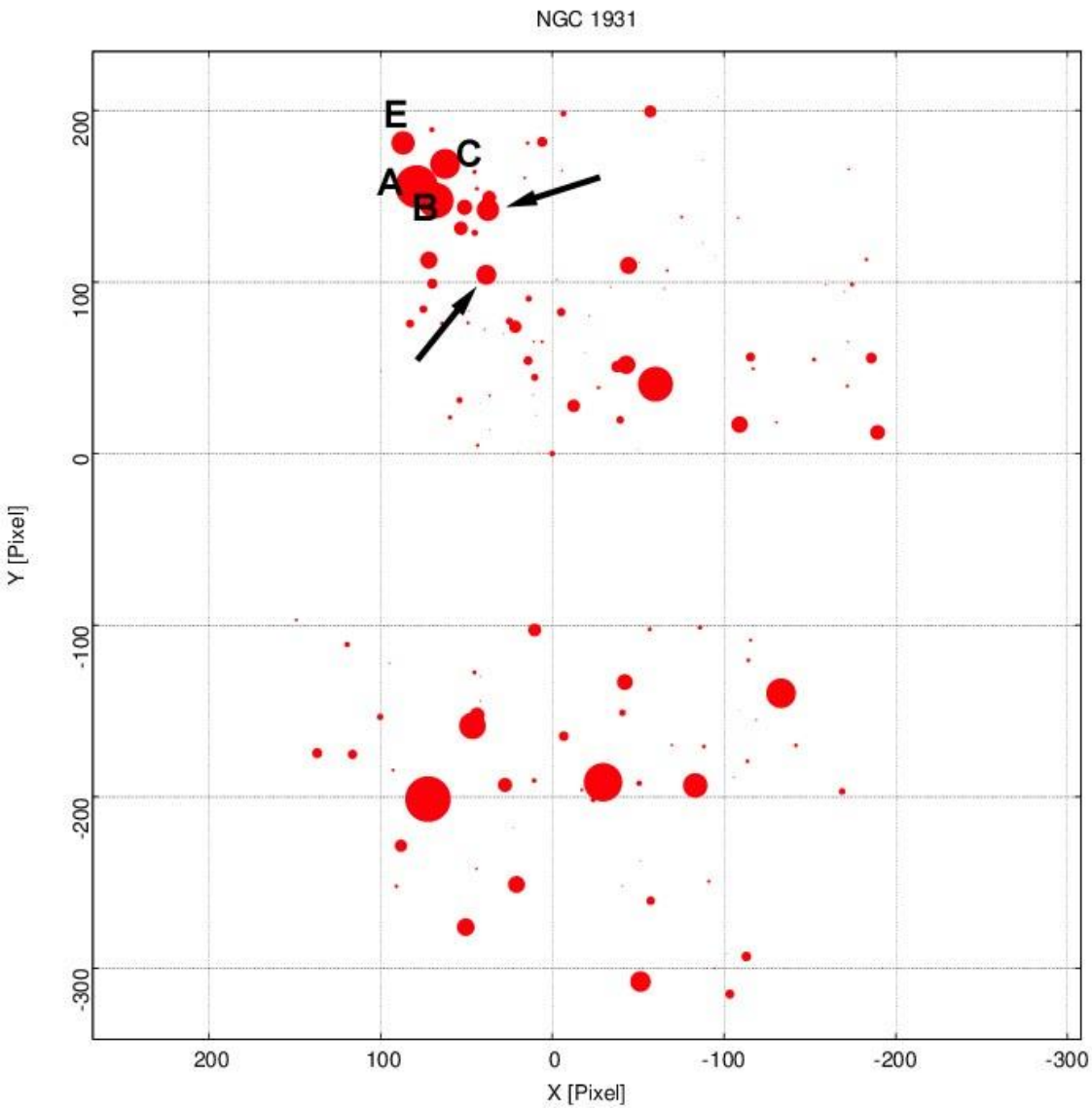
254/1494mm (10-inch f/5.8) Newtonian. Seeing: fair. Transparency: a little better than average.

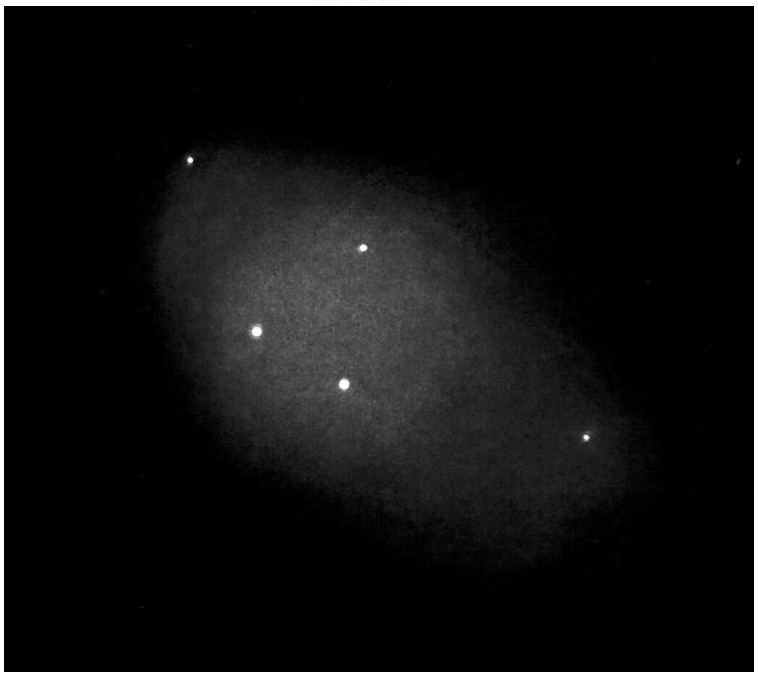
43×: NGC 1931 is just a short hop westward from starfish-like M36. It presents a small hazy spot surrounding a star.
115×: The nebula spans about 3 arcminutes, and the star now appears triple. Several additional stars straggle south through west-southwest of the nebulous mass.
213×: Six stars are now buried in the nebulosity, three brightest members arranged in a little triangle.

The WEBDA cluster plot below marks the four trapezium-system stars viewed as well as two additional stars spotted within the nebula.

V-magnitudes of the trapezium stars according to WEBDA: A=11.4, B=12.3, C=13.0, E=14.0. There is a component D in the trapezium system very close to B, but it's thought to be magnitude 15.8 or dimmer and was not seen. The two arrowed stars were visible: the northern one shining at magnitude 14.1, and the southern one at magnitude 14.5.

After the star-plot is the sketch I made at 213× with the 10-inch scope on 17 February 2020 at 7pm EST. It was a pleasant night for February. The temperature was in the lower 20s and there was no wind. Unfortunately the seeing and transparency were both below average, and there was full snow cover on the ground. I couldn't see the 14.5-magnitude star mentioned in the previous observation. I decided to sketch just the part of the nebula I could see and the four stars visible within it. My sketch looked pretty good to me, but a scanned image didn't show the faintest parts, so I penciled over the original sketch to make it scan better, I hope without changing anything too much. North is up and west to the right.


NGC 1931
E
C
A
B
200
100
0
-100
-200
-300
Y [Pixel]
X [Pixel]



Chris Elledge: Observer from Massachusetts

On January 26th @ 7:28pm EST, I used a 10-inch f/5 refractor to observe NGC 1931 from the ATMoB Clubhouse. Sky conditions were: Bortle Scale 6; NELM 5.0; Transparency: Fair; Seeing: Average.

With Auriga approaching zenith, I was able to detect the approximate location of Phi Aurigae and its associated cluster with naked-eye averted vision. Centering this area in a 35mm 1.9º FoV, the NGC 1931 cluster was visible at the Eastern edge of the view.

At 115× (11mm 0.71º FoV) there is a group of mag. 11 stars forming a square with corners in the NE, SE, SW, & NW directions (TYC 2411-1002-1, TYC 2411-2115-1, TYC 2411-2320-1, & BD+34 1074A). The NW star of the square has visible nebulosity around it. A close pair of mag. 11 stars (TYC 2411-2086-2 & TYC 2411-0996-1) are located to the East of the SE star of the square. Two more mag. 11 stars sit to the West of the square. One West of the SW corner (TYC 2411-2209-1), and one West of the NW corner (TYC 2411-2224-1).

At 270× (4.7mm 0.3º FoV) the NW star (BD +34 1074A) of the square has a small concentration of nebulosity around it. It makes a cone from the East side of the star and spreads out a short distance arcing between the North and West. Three stars of the tight trapezium cluster containing BD +34 1074 A and B are easily split and visible. A 4th star, mag. 14, was sporadically visible when the seeing settled.

Mario Motta: Observer from Massachusetts

Taken with my 32-inch telescope, and SBIG STL 1001E camera. One hour of H-alpha, one hour of Sulfur S2 filters, and only 20 minutes of O3 filter as there was essentially no Oxygen signal.

Processed in PixInsight.

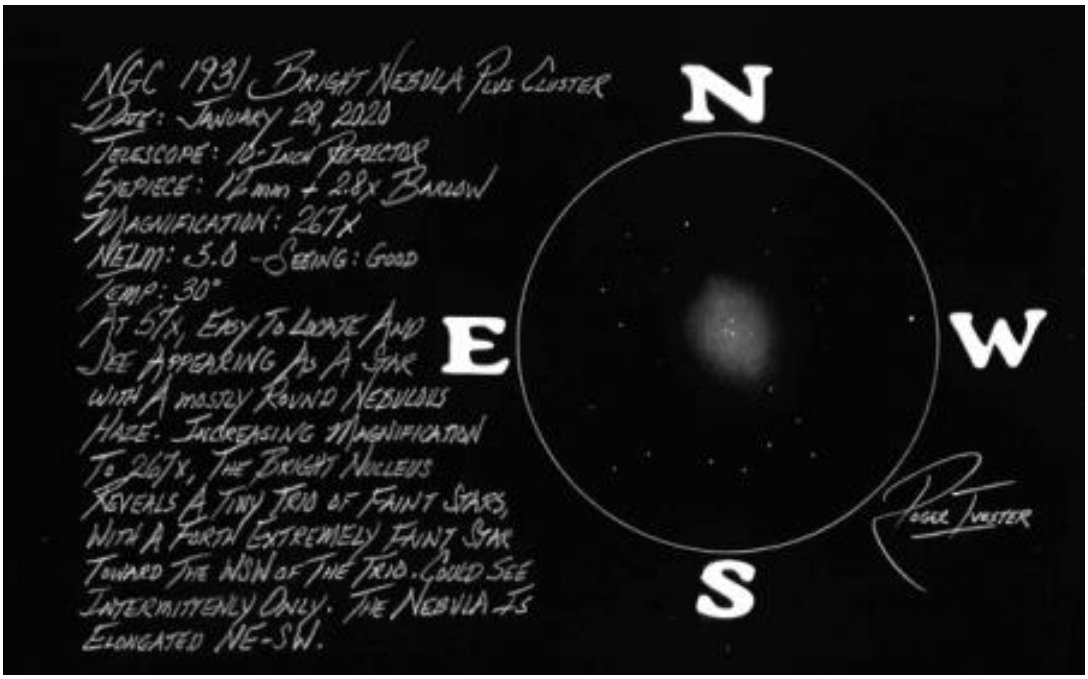
Roger Ivester: Observer from North Carolina

On the night of January 28, 2020, the transparency and seeing were very good. Using my 10-inch, f/4.5 reflector, NGC 1931 was very easy to locate and see at 57×, appearing as a star with a mostly round halo of nebulosity.

When increasing the magnification to 267×, using a 12mm eyepiece and a 2.8× Barlow, the bright nucleus revealed a tiny trio of faint stars, with a fourth, much fainter star, toward the WSW. This fourth star was extremely difficult, and could not be held constantly, but intermittently at best. The nebula was elongated, with a NE-SW orientation.

The first time I observed NGC 1931 was with poor seeing, on January 8, 1994, and could not see the trio of stars. My second attempt to see the trio of stars was in January, 2020, but again with poor seeing and transparency, and was unable to see any of the faint stars.

Pencil sketch, with the colors inverted, next page:



The following is the complete listing of all Observer's Challenge reports to-date.

https://rogerivester.com/category/observers-challenge-reports-complete/