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

OCTOBER 2013

IC-5146 (Caldwell 19) – The Cocoon Nebula In Cygnus

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.

IC-5146 (Caldwell 19) – The Cocoon Nebula In Cygnus

IC-5146 is a nebulous region known as the Cocoon Nebula. It's also known as Caldwell 19 and SH 2-125. The nebula is associated with an open star cluster which includes some of the brighter surrounding stars, known as Collinder 470. Though the Cocoon is listed as mag. 7.2, it's extremely hard to see visually unless conditions are right. Observers with scopes down to four inches have seen it at low magnification, yet those with larger scopes cannot make it out most of the time at average magnifications in the 100X range.

The cluster lies approximately 3,300 light-years away, and the central star that lights it formed around a relative 100,000 years ago. This is a young nebula by astronomical standards. The object is linked, at least visually, to the looping dark nebula Barnard 168, though chances of spotting this one visually require low power, wide field and supreme visual conditions.

Observations/Drawings/Photos

Francisco Silva: Observer from Nevada

NOTE: We'd like to welcome new Challenge participant, Francisco Silva from Las Vegas. Welcome Francisco!

I observed the IC-5146, also known as the Cocoon Nebula on October 20, 2013, near Searchlight, Nevada. I used a 114mm (4.5-inch) reflector and a 25mm EP. The seeing was 8 and transparency 3.

It was fairly difficult to locate the nebula due to the rich star field, and a bit of moon made it worse. It was good to see the glow of the stars had but it was hard to see the cloud of gas surrounding it. But thanks to the UHC/LPR filter, I could visualize it as a halo or fog, but nothing near to a cloud.

The American Association of Amateur Astronomers
www.AstroMax.com

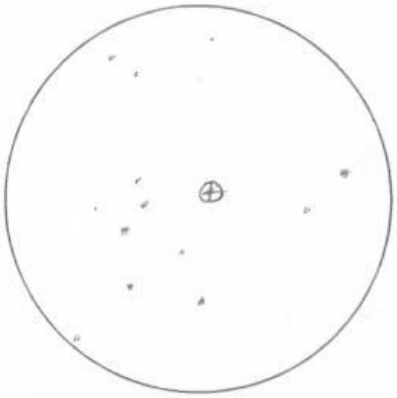
Observation Log
and SketchTemplate

Observer: FRANCISCO SILVA
Date: 10-20-2013
Time: 22:00 UTC - 7 DTS-YES
Site: NEAR TO SEARCHLIGHT, NV
Seeing (1-10) 9 Transparency (1-5) 3

Object: IC 5146
Constellation: CYGNUS
R.A. ____h ____m Dec. ____d ____m
Listed Magnitude: ____ Listed Size: ____
Source: ____
Telescope: MEADE 114 mm REFLECTING
Eyepiece(s): 25 mm HD-60
Filter(s): UHC/LPR

Field Drawing

Low Power Ocular

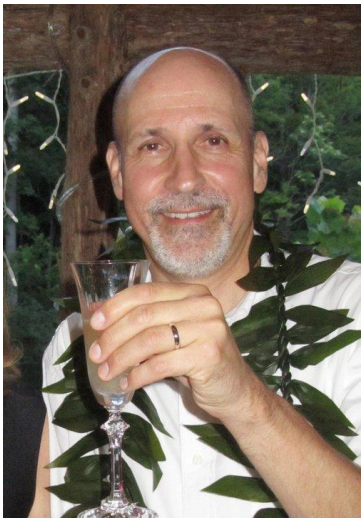


High Power Ocular

Description and Notes

-IT WAS A LITTLE HARD TO FIND BECAUSE THE NUMBERS OF STARS IT HAS. AND THE MOON WAST NOT VERY HELPFUL
-WAS GOOD TO SEE THE GLOW THEY HAD, BUT IT WAS HARD TO SEE THE CLOUD OF GAS SURROUNDING IT BUT THANKS TO THE FILTER UHC/LPR I COUD VISUALIZE AS A HALO OR FOG BUT NOTHING NEAR TO A CLOUD

James Dire: Observer from Hawaii



Also known as the Cocoon Nebula, IC-5146 is a striking emission nebula 12 arc minutes in diameter. An open star cluster, Collinder 470, is embedded within the nebula. Both are located 4,000 light-years away and span 15 light-years of space. Published mag. estimates for IC-5146 range from 7 to 10. In reality, the cluster is probably mag. 7 and the nebula is mag. 10, but you are really seeing both simultaneously.

One way to find the Cocoon Nebula is to star hop 9° due east of Deneb to the fourth magnitude star Rho Cygni, and then hop another 3.75° northeast. Another way to find it is to locate the stars 80 (Pi 1) Cygni and 81 (Pi 2) Cygni. These mag. 4.67 and 4.25 stars are two degrees apart and are found 12° east-northeast of Deneb. To find IC-5146, follow an imaginary line from 80 Cygni through 81 Cygni south, two more degrees.

The Cocoon Nebula is a stellar nursery, similar to the Orion Nebula and the Carina Nebula (which contains Eta Carina). The stars in Collinder 470 formed out of the gases contained within this giant molecular cloud. Like most stellar nurseries, the Cocoon Nebula contains emission nebulae, reflection nebulae and dark nebulae. Light from the hot young stars embedded within the nebula scatters off of dust grains resulting in blue reflection nebulae. The nebula's gas is mostly hydrogen, which emits red light at 656.3 nanometers wavelength when heated by the embedded stars. Thus long-exposure images show beautiful blue and red colors.

The accompanying image was taken with a 190mm (7.5-inch) f/5.3 Maksutov-Newtonian telescope with a Canon 30D camera. This two-hour exposure shows the brightest regions of the Cocoon Nebula in detail comparable to the view in an 8-12 inch telescope at 100X magnification. Note the dark lanes scattered throughout the center. The image covers a region 40 by 30 arc minutes. Longer exposures show the nebula extends throughout this field of view, but these regions are difficult to see visually.

The colors captured with the Canon 30D are subtle compared to images taken with astronomical CCD cameras. However, the human eye won't even perceive this much color when viewing the object in the telescope eyepiece.

Sue French: Observer from New York

With my 105mm (4-inch) refractor at 17X, it was a snap to pick up the end of the long dark ribbon Barnard 168 that was near Messier 39 and follow it to the Cocoon Nebula. At first, I couldn't see the nebula, but adding a hydrogen-beta filter made it immediately apparent with a mag. 10 star at its heart and another at its southern edge. An O-III filter also helped, but not as much. I could see the nebula without a filter at 47X, and a filter-less view improved the visibility of the embedded stars. There were two faint stars between the mag. 10 pair, two more east of center, and one on the nebula's western edge. The nebula spanned about 8 arcminutes. The Cocoon looked quite patchy at 68X.

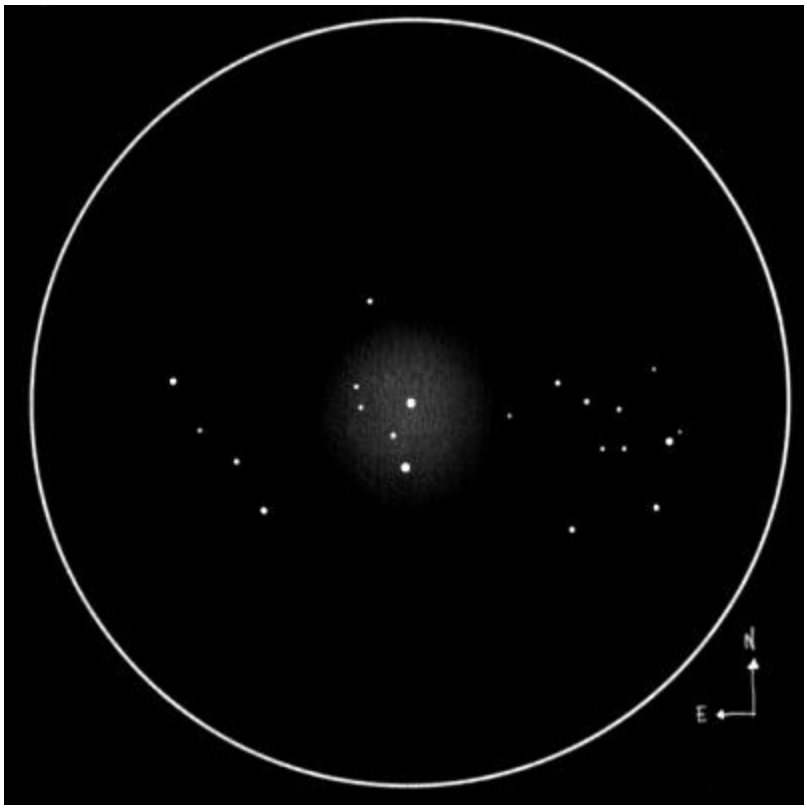
In my 10-inch reflector at 118X, the brightest sections of the nebula were arranged in two or three northward-reaching fingers. The middle one had the nebula's central star at its edge, the eastern one went through an arc of three mag. 11 - 12 stars, and the western one was least obvious. The fingers blended together between the mag. 10 stars, forming a wide band of haze that dominated the nebula's southeastern quadrant. The entire Cocoon appeared about 9 arcminutes across, and looked a bit like a catcher's mitt.

Jaakko Saloranta: Observer from Finland

IC-5146 is a low surface brightness emission/reflection nebula in Cygnus, discovered by Reverend Thomas Espin in 1899 with a large 17 ½-inch refractor. The mag. 7, 10' open cluster Collinder 470 is located inside IC-5146 but is fairly inconspicuous visually. It was discovered by Per Collinder before 1931. A very faint reflection nebula VdB 147 lies little less than 10' west of IC-5146.

I rose to the LVAS October challenge a little bit early on the September 3, 2013, armed with my trusty 4.5-inch reflector. I described the view as follows: "IC-5146 is high in the sky, altitude must be around 70°. Roughly a 7' circular glow surrounding two mag. 9.5 stars best visible @ 76X (39') + UHC filter. The glow appeared more centered on the northern star. On occasion, the E side of the nebula appeared slightly brighter and more well defined. I saw three additional mag. 12 stars within the glow. The asterism to the W appeared as a pseudo-glow at low power with the UHC filter. Sketched @ 114X (26') + Lumicon UHC. SQM-L reading in zenith 19.73, NELM 6.0 in the same spot. Temperature 48°F".

Happy (Finnish) father's day!


N
E

Jay Thompson: Observer from Nevada

The night of October 5, 2013 was excellent. It was very transparent, with very steady seeing. All told, it took about 2 hours to find, see, and confirm IC-5146 (Cocoon Nebula). This is a very faint emission nebula. I star-hopped from pi-1 and pi-2 Cygni. The emission nebula was brutally faint. It is at one end of the dark nebula B-168, which is much easier to see and trace. At one end, surrounding five stars was an extremely faint glow. There was a hint of emission nebulosity using a 32mm EP at 63X, with a 16mm (125X) showing the nebula the best, though still very difficult to see. I used a black observing hood to block ambient light.

On October 6, 2013, I again observed from Meadview with the 17.5-inch. This was an excellent night, very transparent with steady seeing. It was slightly more transparent than the previous night but the seeing was not quite as good, but still very steady.

I revisited the Cocoon, finding it immediately by tracing B-168 using a 28mm EP (71X). I observed a hint of nebulosity. A faint glow was evident with the 16mm (125X). An O-III filter was no help. I next tried the 16mm (125X) with an H-beta filter and the observing hood, which gave a little contrast enhancement, but it was still a very soft roundish glow around 5 stars.

On November 3, 2013, it was visible through the 17.5-inch with 32mm (63X) and 16mm (125X) eyepieces. With the 16mm (125X), I saw hints of possible lanes, but given the dimness of the nebula, this could've been "wishful seeing" suggested by familiarity with images. The nebula, as a whole, was definitely there. It was much fainter than the brighter parts of the Cygnus Loop.

Jim Gianoulakis: Observer from Nevada

IC-5146 is also known as Caldwell 19, Sh 2-125, and the Cocoon Nebula. This object is both a reflection and an emission nebula and is found in the constellation Cygnus. The object contains a circular H-II region that is catalogued separately as Sharpless 125. This colorful nebula (as seen in the photograph), is located at the eastern end of a series of dark clouds known as LDN 1035 and LDN 1045. The cluster of stars which lie at the center of IC-5146 are mostly low mass stars like our sun but much younger at only 1 million years old. The nebula is powered by the hot and luminous B0 type star BD +46°3474 whose surface temperature of 30,000 to 35,000° allows it to generate the ultraviolet flux needed to ionize the surrounding gases. The central star began to shine only one hundred thousand years ago along the near side of the current molecular cloud it illuminates. The NGC description refers to IC-5146 as a cluster of mag. 9.5 stars involved in a bright and dark nebula. The cluster is also known as Collinder 470. It shines at mag. +10.0. It's located near the naked-eye star Pi Cygni, the open cluster NGC-7209 in Lacerta, and the bright open cluster M-39. The cluster is about 4,000 light years away. The Cocoon is about 12 arc minutes across, which is equivalent to a span of 15 light years.

When viewing IC-5146, dark nebula Barnard 168 is an inseparable part of the experience, forming a dark lane that surrounds the cluster and projects westward forming the appearance of a trail behind the Cocoon.

These pictures were taken in 2010 and 2011 from my Las Vegas backyard.

Rob Lambert: Observer from Nevada

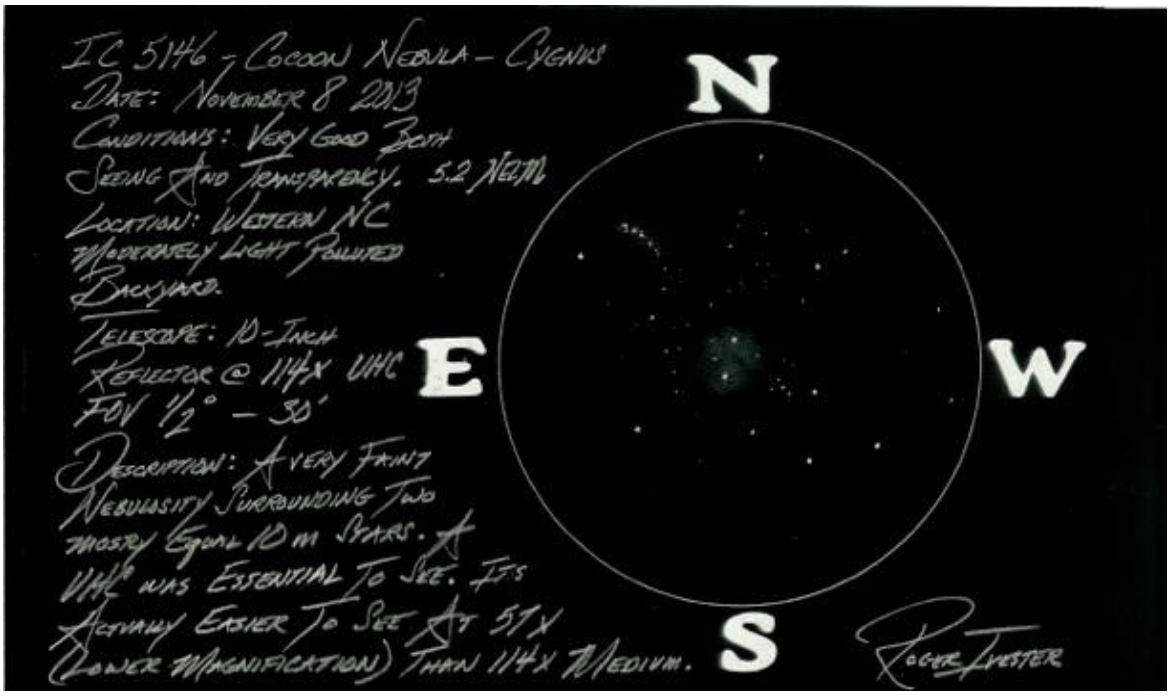
IC-5146 is one of my favorite nebulae, primarily because I'm somewhat partial to emission nebulae due to their H-II regions that distinctly show up as red or pink in my Mallincam images. Although I've not been able to use my image capture software to produce a better image, due to a hard drive failure on my Mac Mini, you can distinctly see the red H-II regions in this snapshot of my monitor screen. The large central star which ionizes the Hydrogen in the molecular cloud, is not thought to be a product of the cloud that we see. Instead, it's thought to be the product of a now dissipated cloud that was in front of the nebula we now see. It's also thought that the winds from this central star have created the cavernous hole in the center of the nebula and the dark lanes that are visible across it.

The Cocoon Nebula lies in a rich star field, as would be expected considering its location in Cygnus. Many young hot stars are seen all around the area surrounding it. I wasn't able to detect the reflection portion of the nebula that is mentioned in writings of other observers. However, the presence of dark regions around the outside of the emission nebula and the absence of stars in those areas hint of dark clouds of dust being associated with it.

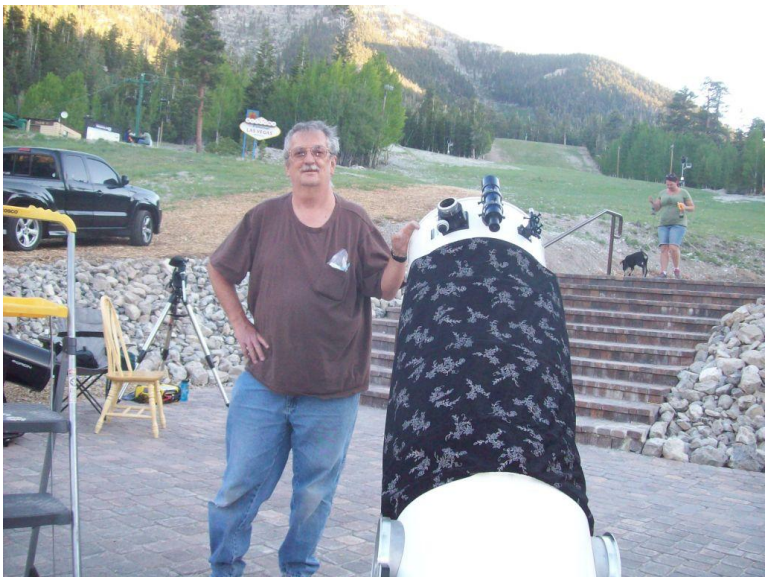
The snapshot image below was captured with a Canon T3i aimed at the center of the display monitor. Because of the low light situation, I had to manually adjust the focus of the camera and didn't realize, until I examined the images later at home, that my focusing of the camera was not spot on. The stars are a bit fat. The actual image on the monitor was much sharper. Integration was 14 seconds. Magnification was about 60X through my 5-inch Apochromatic Refractor.

Roger Ivester: Observer from North Carolina

When observing IC-5146 with my 10-inch reflector at 57X, and with the employ of a UHC filter, I saw a faint haze encapsulating two equal mag. 10 stars. I saw the faint nebulosity with direct vision. When I increased the magnification to 114X, I noted a lighter area with less concentration between the two mag. 10 stars. I saw at least two additional faint stars embedded within the nebula, located E and W. Another interesting feature, and fairly easy to see, was a dark streak leading away toward the west, known as B-168. A faint chain of stars was located NNE, and pointed toward the nebula. The following sketch was made using a No. 2 pencil, and a blank 5 X 8 note card. The colors were inverted using a scanner.


IC 5146 - Cocoon Nebula - Cygnus
Date: November 8 2013
Conditions: Very Good Both Seeing And Transparency. 5.2 NELM.
Location: Western NC Moderately Light Polluted Backyard.
Telescope: 10-Inch Reflector @ 114x UHC
FOV 1/2° - 30'
Description: A very Faint Nebulosity Surrounding Two Mostly Equal 10 m Stars. A UHC was Essential To See. It's Actually Easier To See At 57x (Lower Magnification) Than 114x Medium.
N
E
W
S
Roger Lyster

Fred Rayworth: Observer from Nevada



The Cocoon was by far, the most challenging of all the objects we've ever attempted. I never knew how hard it would be to spot it until I tried, and I tried and I tried! As I went back through my database, I could've sworn I'd observed it with my home-built 16-inch f/6.4 from one of the Okie-Texes in the mid-90's, but alas, my database only shows the one successful observation from a few weeks ago in October.

I used the scope above, a 16-inch f/4.5 with a magnification of 102X. I didn't bother trying other magnifications. I knew the extreme difficulty I had seeing anything at all wouldn't have been helped by boosting or lowering it. This observation happened on October 26, 2013 from Redstone Picnic Area on the North Shore of Lake Mead. It was clear, calm and cool. Thin clouds were to the south but they never crept very far up into the sky. I stayed mostly in the central to northern reaches, so those clouds never bothered me at all. At times I was wondering about transparency as it seemed a bit off, but overall, it was a pretty decent night. Maybe not the best, but still nice.

Let's talk about filters. With no filter, knowing I was looking directly at the spot, I could see no hint of anything, including the dark area of Barnard 168 (it isn't on my Megastar charts), though I did noticed a kind of voided area that was probably part of this nebula. However, since I didn't know it was there at the time, I can't count it as an observation!

When I tried an O-III filter, outside of blanking out about half the stars in the field, I couldn't see any hint of nebulosity. Wrong type of filter.

I finally put in my UHC, a filter that was probably a bit too strong. What I should've done was use an LPR filter, which I have but only in 1 ¼". However, I didn't want to switch from my 18mm 82 degree EP to a 17mm 68 degree EP that is 1 ¼ format. Call it laziness, but I can live with that.

With the UHC, and knowing the exact spot with two background stars which mark the spot (one is the central star, the other is off to the side), I started "mowing the lawn." Using a very gentle motion, I swept over the spot slowly, used averted vision, and kept the center two stars just off center. By doing this, eventually (maybe the sky just opened up a bit more), I finally caught a peek of something going on. Once my eye adjusted to that "something," I had an object to grab onto. Eventually, more details emerged. Slow but sure, a form took hold. I had to back off and blink a few times, then approach the eyepiece again. I lost it, mowed the lawn more gently this time, and found the little lumpiness again. Second time, I found it easier and a bit more detail crept in. After using this cycle and before eye-ache and headache set in and my vision started to blur, I garnered enough detail to produce the drawing, which I did later from memory. The result is below.

These are my actual observation notes: "Extremely faint disturbance against the background stars. Completely featureless with just a hint of a round shape, roughly so. Could only see it with a UHC. The O-III blocked it completely and the raw EP didn't have enough contrast to pick it out. With somewhat tedious sweeping, I finally garnered some surprising details before my eye and body started to ache."

Over the past two months, I've made several attempts to see it, but this was the only successful one. The details I saw were confirmed immediately the following weekend when Rob Lambert found it with his 5-inch refractor and Mallincam setup. Even then, David Blanchette, who was at the monitor, had to fiddle with the TV controls to get it to show up properly.

This one definitely put the "challenge" in the Challenge!

IC-5146

102X