MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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&

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July 2011

NGC 6645 – The Ringlet Cluster - Open Cluster In Sagittarius

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 6645 – The Ringlet Cluster - Open Cluster In Sagittarius

NGC-6645 is a mag. 8.5 open cluster buried in the rich Milky Way of Sagittarius. The actual cluster consists of about 35 stars and by most accounts, appears as a ring with a hollow center. The magnitudes of the individual stars vary providing an interesting view that with a little study, can give the observer quite a challenge to draw accurately if one were going for specific details. Details and history on this object are sketchy but it is nevertheless and real gem to seek out in the night sky. It's called the Ringlet Cluster because of a distinct ring shape, named by Roger Ivester in August, 2011 and approved by Fred Rayworth and Rob Lambert as part of the Observer's Challenge.

Observations/Drawings/Photos

Dr. James Dire: Observer from Hawaii

NGC-6645 is a small open star cluster in Sagittarius located 2° north of M-25. At 14 arc-minutes in diameter, the cluster is about half the angular size of M-25, but nearly 4 magnitudes fainter. The cluster shines at mag. 8.5, but only has one or two stars brighter than mag. 10. Most of the scores of stars in my image are mag. 13 and fainter. I viewed and imaged the cluster on July 27, 2011. Viewing was through a 70mm (2.6-inch) f/6 achromatic refractor using a 26 mm eyepiece. The cluster was faint but very distinguishable from the myriad background Milky Way stars. With this aperture and magnification, the cluster was a fuzzy blur with no individual stars resolved.

I imaged the cluster with my 102mm (4-inch) f/7.9 apochromatic refractor using an SBIG ST-2000XCM CCD camera from the KEASA Observatory on the west side of Kauai. The image is a 30-second exposure. Scores of NGC-6645's stars are resolved at the center of the image. I made several attempts to view the cluster with my 14-inch f/6 Dobsonian, but was clouded out each time.

Buddy L. Barbee: Observer from North Carolina

This observation was made Friday, June 26, 2011 while camping at Hagan Stone Park in Guilford County, NC. I was using a 4-inch refractor with a 7mm eyepiece for a magnification of 125X.

Michael E. Bakich in his new book, *1,001 Celestial Wonders to See Before You Die*, commented in his description that "The feature you want to see lies near the center of the cluster. It is a circlet of 15 stars whose center is empty." Also the NGC/IC Project web page states in its description that with a 17.5-inch scope at 82X, there's a noticeable "hole" in the center that's devoid of stars.

I located this cluster with a 24mm eyepiece at a magnification of 37X and it looked like a small gray spot with only a few stars visible. I began to up the magnification to see how many more stars I could see. I settled on the 7mm for a magnification of 125X. Then settling back to just look at the cluster for a while before sketching it, one can't imagine my surprise to see the hole near the center of this cluster. I had thought that this was only visible in larger telescopes, but there it was. I was only able to see 12 of Michaels 15 stars in the circlet with the 4-inch refractor, but the hole was definitely visible. Although the cluster has a listed size of 15 arc minutes, in the 4-inch it only appeared to be about 9 arc minutes in diameter.

At 125X, this cluster was a pretty faint unresolved haze. There were only about 30 dim stars visible including the 12 stars in the circlet over the unresolved haze. There wasn't even any haze of unresolved stars in the circlet. On that clear night with a naked eye limiting magnitude of 5.2, using a 4-inch refractor in the light-polluted sky of Guilford County, NC, I was very pleased with this observation.

After making the sketch, I settled back in a chair with my 10X50 binoculars and my *Sky and Telescope Pocket Sky Atlas* to see if it was visible with the binoculars. It took me about 20 minutes to go star by star until I was sure that I had found this cluster. It wasn't very bright, in fact it was a very dim small gray spot, but it was visible in binoculars also.

DEEP-SKY OBSERVATION FORM

CONSTELLATION: Sagittarius

OBJECT: NGC 6645

Day & Date: Sun., June 26, 2011
Time (local): 12:50 am EDT
Time (UT):
Observer: BLB
Location: Hagan Stone Park, Guilford Co., NC.

Seeing (1-5): 4
Transparency (1-7): 4
NELM: 5.2
Temp: 72°F Wind: 0-5 mph
Humidity: 45%

INSTRUMENT
Telescope: TV102
Aperture: 4" (102 mm)
Focal Length/Ratio: 880mm / f8.6
Eyepiece: 7mm
Magnification: 125×
Field-of-View: 00°29'
Filter: None

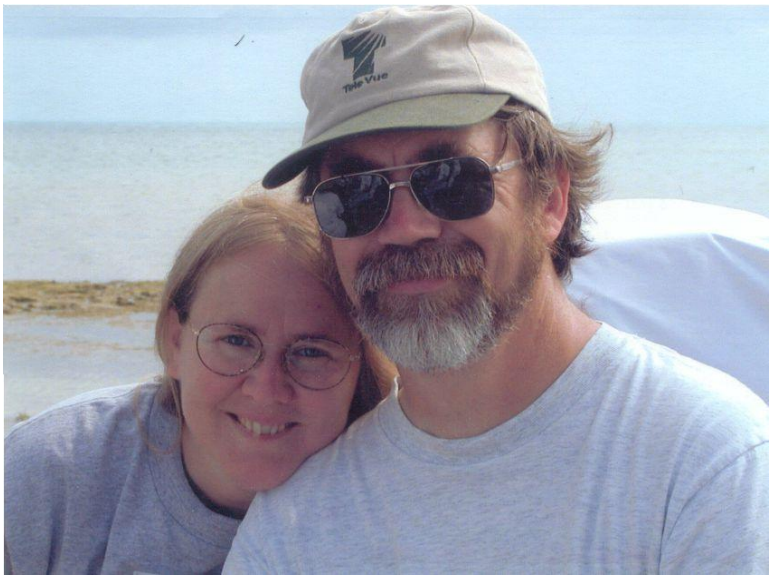
OBJECT
RA: 18 hr. 32.6 min.
Dec: -16 d. 59 min.
Type: Open Cluster
Listed Magnitude: 8.5
Listed Size: 15'
Altitude of object: 35°±

NOTES

This cluster is a pretty faint unresolved haze with about 30 dim stars visible. Near the center of the cluster is oval of approximately 12 faint stars with no stars visible in the center of the circlet.

Using my 10×50 Binoculars and my Pocket Sky Atlas, NGC 6645 is visible as a very faint, small gray hazy spot.

Sue French: Observer from New York



July 7, 1989, 1:05 am EDT

10-inch f/6 Newtonian, 48X, 73X. Seeing: Poor. Transparency: Good

More than 50 moderate to faint stars in a rich, irregular open cluster with a diameter of about 8'.

September 26, 2006, 9:40 pm EDT

105/610mm (4-inch f/6) apochromat. Seeing: Fair. Transparency: Fair

17X: Very pretty diamond-dust cluster with a dit, dah, dah of stars leading to its eastern side.

87X: Rich group of faint to very faint stars in 8½' ´10' NNE-SSW. About 35 stars, many in little bunches and lines.

September 1, 2007, 10:00 pm EDT

254/1494mm (10-inch f/6) Newtonian. Seeing: Fair. Transparency: Fair. 73% waning gibbous Moon up.

42X: Very pretty. Rich in faint to very faint stars. About 10'. A line of brighter stars (ESE-WNW) leads up to it from the east.

115X: About 70 stars irregularly grouped in small knots and bunches.

September 2, 2007, 9:20 pm EDT

254/1494mm (10-inch f/6) Newtonian. Seeing: Fair. Transparency: Good

68X: Very pretty, very rich in fairly bright to very faint stars. About 11' long, elongated NE-SW. There's an oval void near the center.

115X: About 70 stars. Prominent mag. 10 pair in the southern part of the group with a companion of about mag. 12.

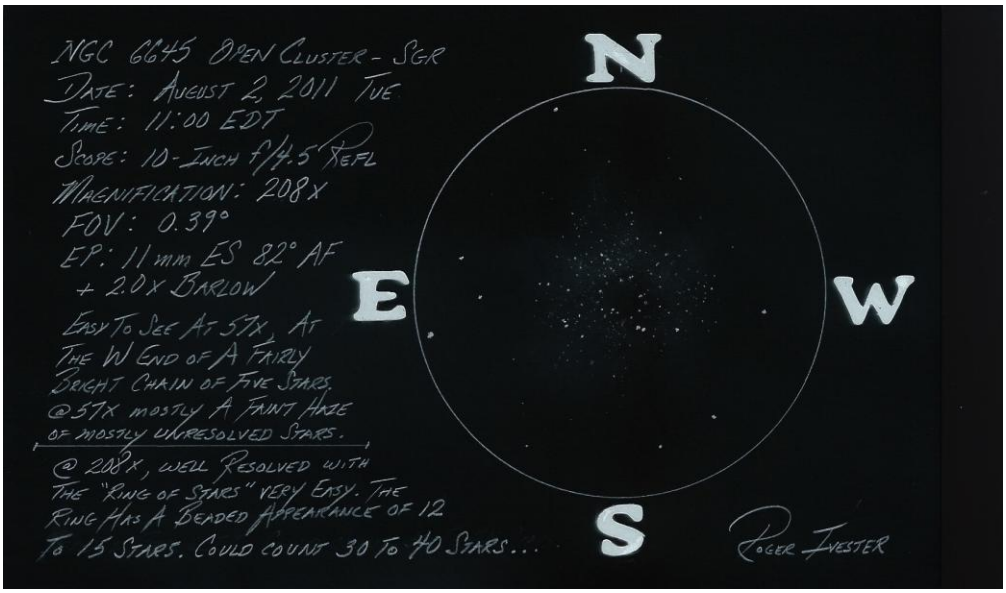
Roger Ivester: Observer from North Carolina

The Observers Challenge for July is NGC-6645, a beautiful open cluster located in the constellation of Sagittarius. On July 24, 2011, I observed this cluster with my 4-inch refractor. However, sky conditions were terrible due to very high humidity and haze. The naked eye limiting magnitude was about 4.0, definitely not a good night, but this can be typical of a mid-summer sky in the foothills of North Carolina. I was also observing from my moderately light-polluted backyard. At 50X, the small refractor presented the cluster as little more than a faint haze, with only a few of the brighter members being resolved. When I increased the magnification to 90X, an obvious grouping of stars made a small ring with the center being devoid of any stars. I could count only 20 stars due to the poor conditions.

On July 28, 2011, sky conditions had much improved, with the limiting magnitude being about 5.0 or slightly better. Again, I observed it from my backyard within the city limits of Boiling Springs, North Carolina. The transparency was fair, but seeing was superb, and this allowed me to use a magnification of 208X with my 10-inch reflector, which really brought the cluster to life. I was able to sketch the cluster, and make some notes. However, I wasn't really pleased with my sketch.

Fortunate for me, the night of Tuesday, August 2, 2011 was also excellent. I made a note "a desert sky in Boiling Springs" as the humidity was 21% during the late afternoon, even though the temperature was near 100°. It's very seldom that we have humidity this low during the summer months. I knew this would be an excellent night for observing, and it was. The naked-eye limiting magnitude was 5.5 or possibly a bit better, with good transparency and again, excellent seeing. The 10-inch at 208X presented the "ring of stars" encapsulating a dark center without stars very easily. I could count at least 12 stars, creating the ring, which appeared as a "beaded bracelet" in a fairly tight circle. The cluster was fairly large and the shape was very irregular and I counted approximately 50 to 60 stars. Two of the brighter stars of the cluster are a nice, almost equal double, toward the SSW. At low power, the cluster sat west of a chain of five fairly bright stars.

My sketch was made with nothing more than a No. 2 pencil, on a white blank 5 X 8 note card. I inverted the colors using my scanner. The sketch was made with the 10-inch at 208X, with a field of view of 0.39°, and 25'.


NGC 6645 Open Cluster - Sgr
Date: August 2, 2011 Tue
Time: 11:00 EDT
Scope: 10-Inch f/4.5 Refl
Magnification: 208x
FOV: 0.39°
EP: 11 mm ES 82° AF
+ 2.0x Barlow
Easy To See At 57x At
The W End of A Fairly
Bright Chain of Five Stars
@ 57x mostly A Faint Haze
of mostly Unresolved Stars.
@ 208x, well Resolved with
The "Ring of Stars" very Easy. The
Ring Has A Beaded Appearance of 12
To 15 Stars. Could count 30 To 40 Stars...
N
E
W
S
Roger Ivester

Rob Lambert: Observer from Nevada

I initially viewed NGC-6645 after doing a star party for a Church Girl's Camp on July 19, 2011. The conditions weren't ideal so I didn't take my computer with the capture software on this outing since I didn't think I'd be out that long. I was initially using my 4.7-inch refractor and had no problem locating the cluster. At first, it wasn't all that remarkable, just a typical open cluster with nothing that stood out in a scattered star field, until I saw the void in the middle of a small ring of stars at the center of the cluster. There were no stars visible in the center at 33X. I've recently had trouble getting good images from my 10-inch SCT/Mallincam combination and haven't used this setup much for the challenges, but I thought I'd give it a try on this cluster. Even though the image still wasn't great, the ringlet of stars at the center of the cluster was there, but there were 4 dim stars and 4 barely detectable stars that now occupied the void in the ringlet. I was disappointed that I hadn't brought the image capture capability with me, so I pulled out my iPhone and attempted to capture the image on my monitor. I first snapped a shot of the 4.7-inch refractor image at about 33X and although the cluster was very small, it was there, but the iPhone bloated the stars. Because of the increased light-gathering and magnification of the 10-inch SCT, the cluster was just barely discernible in the iPhone image at 150X. The iPhone photos were useless for the Observers Challenge Report. I had to hope for another night when I had my image capture setup with me.

That night came on August 5, 2011 on Mount Charleston (8,500 feet). The night was perfect, considering how close I was to the light dome of Las Vegas and a near 1st Quarter Moon that was about to set. I first located the cluster using the 4.7-inch refractor and there again was the ringlet, devoid of any stars in its center. I captured 20 frames at 3 seconds just to make sure I got a good one. At 33X, the center of the cluster was tiny. It occupied less space on the monitor than what the M-3 globular cluster would occupy. At this magnification, approximately eight stars formed the outline of the ringlet. Another 40 to 50 stars probably constituted the remainder of the cluster. It seemed to have several chains of stars that extended outward away from the cluster. There was a curving chain of 9 dim stars (mag. 12 to 14) starting at the brighter star (mag. 10.5) south of the ringlet that extended toward the west (right side). There was a straighter chain of brighter stars (mag. 10 to 11) extending from the two bright ringlet stars on the east (left side) upward toward the northeast. This chain intersected another 4-star chain of brighter stars (mag. 8 to 10) that extended to the east.

The 10-inch SCT image at approximately 150X shows 12 to 15 stars forming the ringlet at the center of the cluster and then reveals the 8 stars that occupy what would be the void of the

cluster in the 4.7-inch refractor image. Starry Night Pro lists most of the stars in the ringlet as being mag. 11.5 to 13.0. This leaves the dim stars in the void being mag. 14 or less. Starry Night doesn't even show the stars that occupy the void. The brighter stars in the images are mag. 8 to 10. The greater light gathering and magnification of the 10-inch SCT brings out considerably more field stars, which causes the cluster to become less distinctive when compared with the field stars at this magnification. Images are single unprocessed frames (no stacking or co-adding). No adjustments have been made, not even brightness and contrast. These images are as they appeared on the monitor the night they were captured.

A shot with the 4.7-inch.

A shot with the 10-inch SCT.

Fred Rayworth: Observer from Nevada

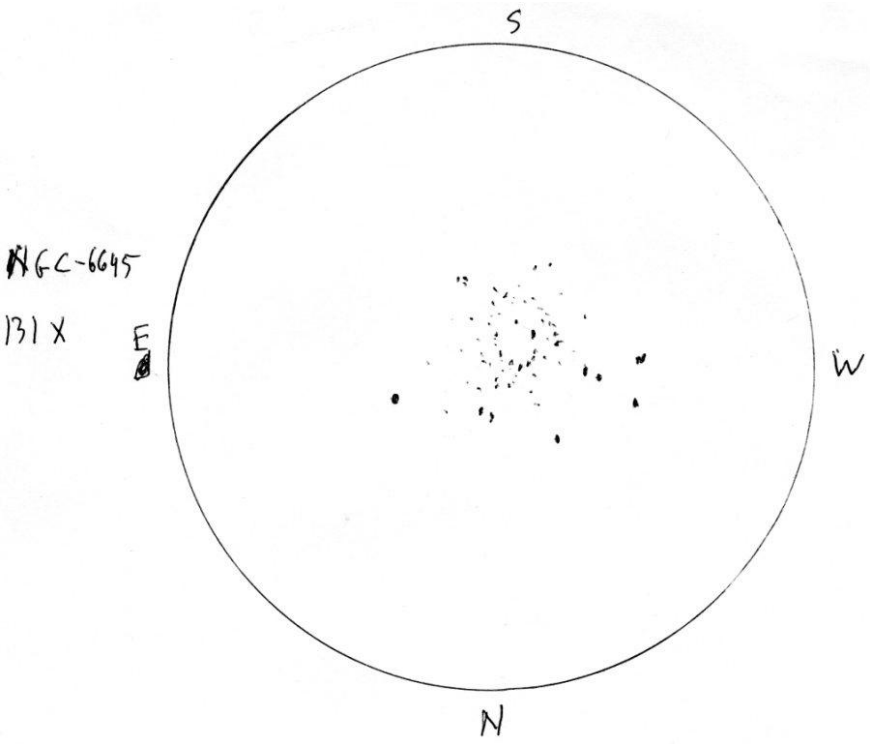
I have only seen it one time before with my home-built 16-inch f/6.4 Dobsonian back in 1997 in Tipton, Oklahoma. At 70X I didn't have much to say about it and my notes were pretty poor and were more concerned with a nearby star formation that reminded me of the Trapezium in Orion, for some reason. I was glad to finally get a more substantial opportunity to observe it on August 6, 2011.

The night was clear and calm with a slight breeze that gusted occasionally but never became more than a slight irritant that didn't even blow my star charts around much. A half moon and the skyglow of Las Vegas were the biggest challenges. The light pollution completely washed out the Milky Way yet I was still able to see enough key stars to navigate to the cluster without having to resort to having someone aim their GOTO scope at it, then aiming my spare laser through their finder or along their tube just to zero in on the area. Speaking of which, I could at least see my laser beam in the sky, so that was a big plus.

It was a public event at Red Rocks Visitor's Center on the far west side of Las Vegas in the foothills, hence the very light-polluted skies. After the crowds died down from looking at the moon and Saturn and M-57, I tried for NGC-6645. By going north from M-22, I found M-25. Once there, I knew that the cluster wasn't too far north and by scanning slowly, I was surprised when I stumbled on it in just a few moments. What really surprised me was how obvious the ringlet stood out against the background. Using a magnification of 131X, the faint clump of stars stood out against what I suspected would normally have been a much richer background of stars in the Milky Way. However, with the light pollution, that extra glow was suppressed. Whatever the case, the cluster stood out and gave it the contrast I needed to see it.

The cluster was uneven in shape and though generally, the majority of stars associated with it seemed to be about the same magnitude, there were plenty in the surrounding area that were brighter to varying degrees. The ringlet was quite obvious with a dark void in the center. The ringlet itself consisted of an uneven array of stars, some clumped together while others were more spread out. Nearby were some brighter members that didn't seem to be part of the cluster but very well might have been. From the photographs I've seen, a lot of the stars all blend together, probably from overexposing the image. For me, I consider the main cluster the fainter stars and the ringlet part. Roger Ivester came up with an excellent name, dubbing it the "ringlet cluster."

As part of the outreach, I showed it to at least a dozen people who had lined up while I studied it. I had thought most people had left but there were still some lingerers, so I centered it and gave them a few hints what to look for and every single one of them saw the ringlet right away, no mistaking it. For so many untrained eyes to see it, that proved its shape. Some photographs I've seen show it much smaller than how it looked, even at 131X. I drew it as I saw it and how it looked to everyone else that night.



Gus Johnson: Observer from Maryland. **NOTE:** On April 19, 1979, Gus Johnson, visually discovered Supernova 1979C in spiral galaxy M-100. NASA announced on November 15, 2010, there was evidence of a black hole as a result of this supernova explosion.

NGC-6645, open cluster in Sgr. A few degrees SE of M-17, large cluster of dim stars. 8-inch @60X and 33X on June 29, 2011. There's a clump of stars in the western part, and near the center is a tight triple, followed by a dim equal double