MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

Compiled by:

Roger Ivester, Boiling Springs, North Carolina

&

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With special assistance from:

Rob Lambert, Las Vegas, Nevada

MAY 2016

M100 (NGC-4321) Grand Design Spiral Galaxy In Coma Berenices

Introduction

The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It's open to everyone that's interested, and if you're able to contribute notes, and/or drawings, we'll be happy to include them in our monthly summary. We also accept digital imaging. 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 the astronomer 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 Observers Challenge. We're not excluding those with an interest in astrophotography, either. Your 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.

M100 (NGC-4321) Grand Design Spiral Galaxy In Coma Berenices

M100, also known as NGC-4321, is a spiral galaxy located in Coma Berenices. It was discovered by Pierre Méchain on March 15, 1781. It's one of the brightest and largest galaxies in the Virgo cluster, despite being physically located in Coma Berenices, at least from our perspective. It lies approximately 55 million light-years away. The size is approximately 107,000 light-years across. It's fairly easy to spot at mag. 9.5, depending on which value you want to believe.

Several supernovae have been discovered within the galaxy and our own Gus Johnson has the distinction of being one of those pioneers. His story is below.

M100 is an outstanding Challenge object for almost any telescope!

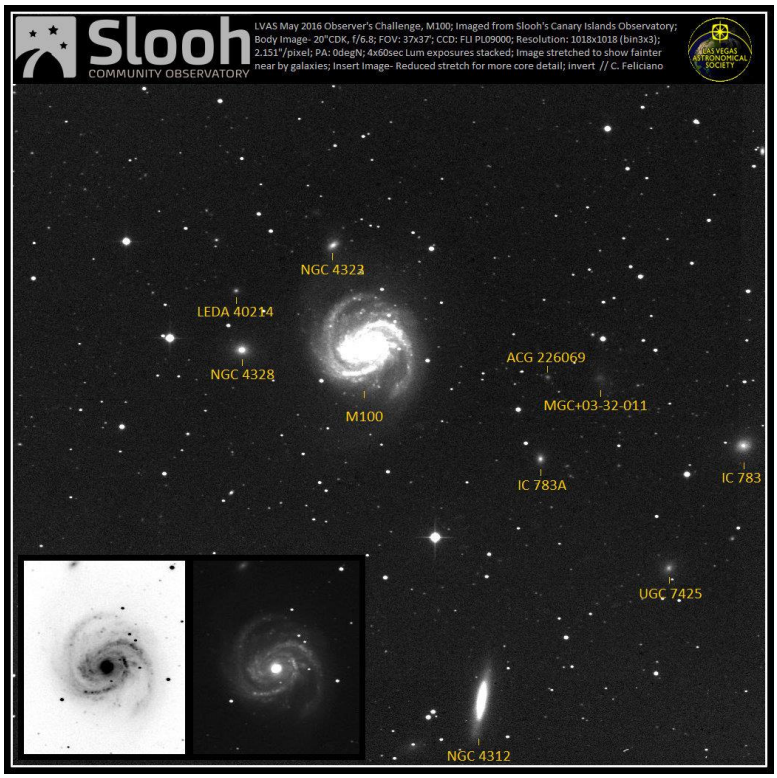
Observations/Drawings/Photos

Christina Feliciano Rivera: LVAS member from Nevada

This May, I observed M100 on five separate nights from my backyard and while using Slooh.com's T1 (20-inch Dall-Kirkham Cassegrain) and T2 (17-inch Schmidt-Cassegrain) telescopes which are located at the Observatoio del Teide in the Canary Islands. I found that the 20-inch captured more details, so I'll share that final image.

For this Slooh image, I stacked four 60 second luminance exposures using MaximDL. This stacking helped bring out more detail in the galaxies arms and also the fainter galaxies that lay within the same FOV (37X37 arc minutes). I was surprised to see how far the faint outer arms appeared to stretch to the north and south. These further reaching bands make the galaxy appear a couple arc minutes larger than the excepted angular size. Are these faint far-reaching arm distortions of M100 caused by the two companion galaxies NGC-4323 and NGC-4328? Examples of this type of dust lane distortion can be seen with some other galaxies and their companions. If this is the case with M100, I don't know, but I plan on trying to find out.

From my backyard, with my 8-inch SCT, M100 looked similar to a nebula, with little definition, but it did have a brighter central condensation. The night of my viewing was not ideal with slight wind and a dusty haze.


Slooh
COMMUNITY OBSERVATORY
LVAS May 2016 Observer's Challenge, M100; Imaged from Slooh's Canary Islands Observatory; Body Image- 20"CDK, f/6.8; FOV: 37x37'; CCD: FLI PL09000; Resolution: 1018x1018 (bin3x3); 2.151"/pixel; PA: 0degN; 4x60sec Lum exposures stacked; Image stretched to show fainter near by galaxies; Insert Image- Reduced stretch for more core detail; invert // C. Feliciano
LAS VEGAS ASTRONOMICAL SOCIETY
NGC 4323
LEDA 40214
NGC 4328
M100
ACG 226069
MGC+03-32-011
IC 783A
IC 783
UGC 7425
NGC 4312

Brandon Doyle: Observer from New York

The star field surrounding M100 is modest, but it's littered with galaxies if you have dark skies and a large telescope. Because I centered the galaxy toward the end of May, a waxing gibbous moon was rising in the SE above the trees and relatively higher humidity helped carry its light to the rest of the sky. The galaxy had low surface brightness that made it impossible to see its full extent and a bright stellar-like nucleus under any magnification (so it appeared almost completely stellar in my sketch). I decided to use very low magnification because so little detail was visible under higher magnifications (plus it gives a sense of scale). I plan on returning to this site by early next month under darker skies to try for any hints of spiral structure. I would also like to see the nearly edge-on NGC-4312 that lies nearby.

On 11 May, 2016, I used a 10-inch reflector at 38X (70°). The wind was 2mph from the SW, temp 60° and cloud cover 10%. I saw a very, very slight smudge, the nucleus was stellar and took magnification, though seeing was not ideal.

I finally got a look at NGC-4312 with my 10-inch reflector at 200X (FOV 58°). The wind was 21mph, temp was 70°, cloud cover was around 1%. It was highly elongated, but there was no mottling or concentrations.

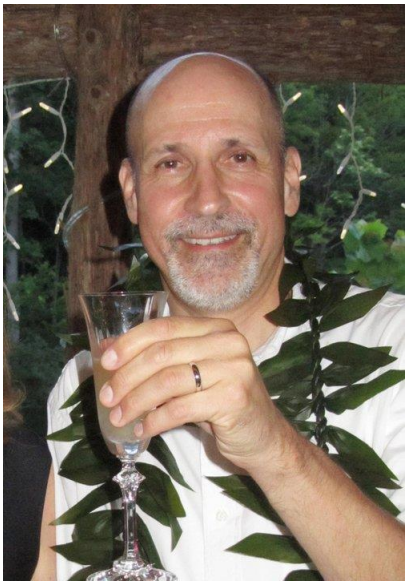
Jim Gianoulakis: LVAS Vice President/Observatory Coordinator & Observer from Nevada

Messier 100, which is also known as NGC-4321, is an example of a grand design spiral galaxy located within the southern part of constellation Coma Berenices. It's one of the brightest and largest galaxies in the Virgo Cluster, located approximately 55 million light-years from Earth and has a diameter of 107,000 light years. It was discovered by Pierre Méchain on March 15, 1781 and was subsequently entered in Messier's catalogue of nebulae and star clusters after Charles Messier made observations of his own on April 13, 1781. It was one of the first spiral galaxies to be discovered, and was listed as one of fourteen spiral nebulae by Lord William Parsons of Rosse in 1850. Two satellite galaxies named NGC-4323 and NGC-4328 are connected with M100 by a bridge of luminous matter.

About the photo: The image was captured the evening of May 24, 2016 from the Las Vegas Astronomical Society Observatory site. It's a stack of 8 X 20 minute exposures through a clear or luminance filter. The telescope was a 12.5-inch CDK riding on a Paramount II, the camera a QSI 683 cooled to -20°. The software used to stack the image was CCD Stack 2 and curves and levels were applied in Photoshop CS2.

The annotated photo contains 8 additional galaxies. M100 being the jewel of the Virgo galaxy cluster.

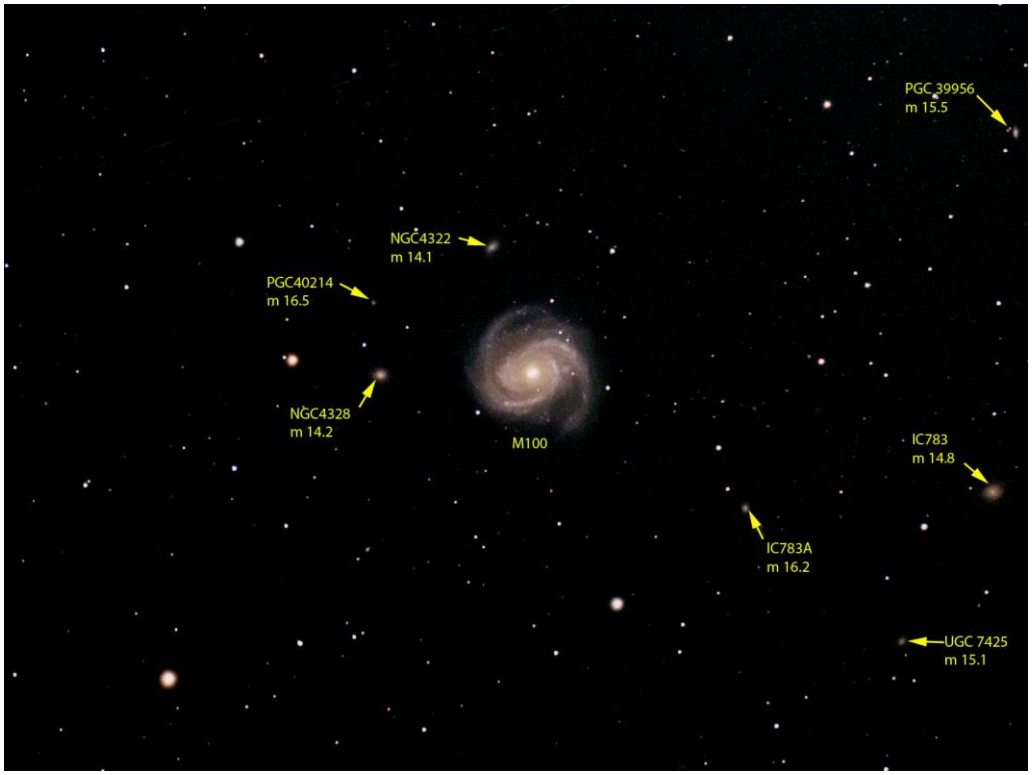
James Dire: Observer from Hawaii



M100 is located in the constellation Coma Berenices. It lies 8° east and slightly north of the star Denebola (Beta Leonis). It can be found roughly 40% of the way along a line from Denebola to the star Diadem (Alpha Comae Berenices). At mag. 9.3, M100 is one of the brightest galaxies in the Coma-Virgo Cluster. It was first spied by Pierre Méchain in 1781 and then confirmed by Charles Messier later that year. It's a face-on spiral galaxy located 56 million light years away as determined by measuring the periods of Cepheid variable stars within it.

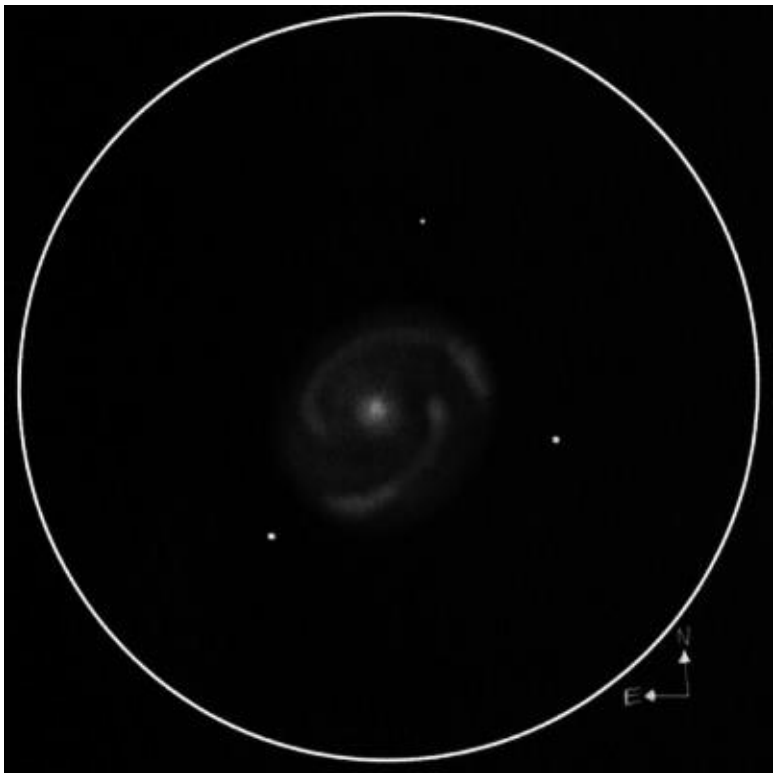
My image of M100 was taken with a 190mm (7.5-inches) f/5.3 Maksutov-Newtonian with an SBIG ST-2000XCM CCD camera. The exposure was one hour. The galaxy has two main spiral arms with numerous branches. The arms contain many massive, hot, blue giant stars with many HII giant clouds of gas. The nucleus is bright and compact.

The second image has labels for several nearby galaxies and their mags. All are members of the Coma-Virgo cluster.



Jaakko Saloranta: LVAS Friend and Observer from Finland

Below is a rough sketch made at the eyepiece. My 8-inch Dobsonian showed a bright galaxy with a nearly stellar nucleus @ 38X (66'). It was best visible @ 152X (16'), but the spiral structure was very difficult. It was flanked nicely by two mag. 14 stars. It had a bright, non-stellar nucleus surrounded by an E-W elongated halo. The northern spiral arm was brighter with a brighter spot at the W end. The southern spiral arm was slightly smaller, but with two brighter areas visible in the arm in both ends. It took over an hour to discern the spiral structure properly with this aperture. I did not look for NGC-4323 and NGC-4328.


N
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Gus Johnson: Observer from Maryland

I first observed this fine galaxy at a farm of my aunt and uncle in Centre County, Pennsylvania near Unionville. This location was not many miles from where later Penn State University would build an observatory near Black Moshannon State Park.

My next recorded date was May 10, 1977 using an 8-inch reflector at 58X. It was large and round, brighter in the center, with an overall medium glow.

My supernova discovery was first seen south of the nucleus on April 18, 1979, as I gave Pastor David C. Long a tour through the Coma-Virgo Galaxy Cluster. I noted a star that warranted checking, for which I made a mental note. Later I checked a photograph and noticed that a star was not there. The next night was clear, so I again viewed the galaxy and saw the newcomer. I then phoned the AAVSO headquarters and reported it. They in turn notified various observatories and it was soon confirmed by Asiago on the evening of April 21, 1979. On April 20th I saw the supernova in the Fitz 13-inch refractor at the Allegheny Observatory in Pittsburgh. The staff, including Tom Reiland as well as members of the Amateur Astronomers Association of Pittsburgh observed the supernova also. The SN was near mag. 11 at maximum and was followed until June 26, 1979 when it was at about mag. 14.3 in my 8-inch at 116X.

SN1979c summary:

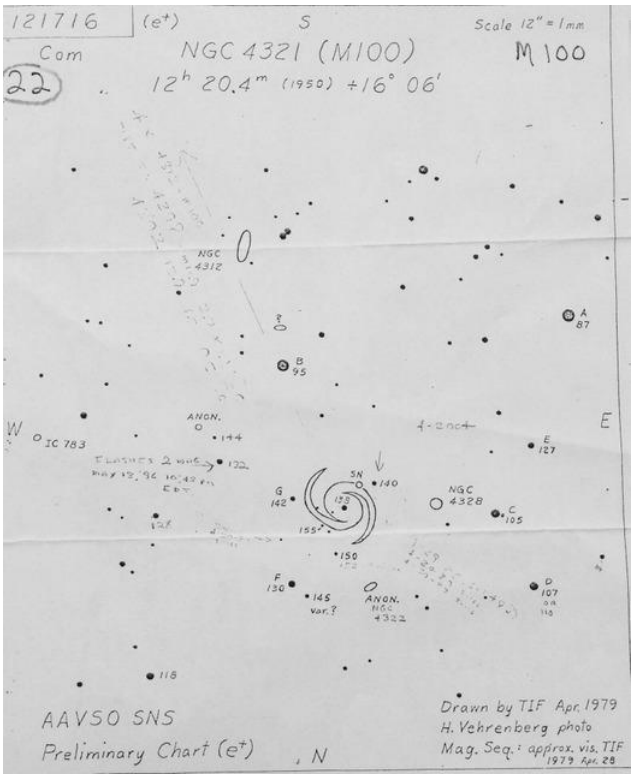
I first saw it on April 18, 1979 and reported on the 19th.

In 1980 it was the first extragalactic SN to be detected with radio telescopes.

The 3rd event was the Chandra X-Ray Center's Patnaude, Loreb, and Jones, who determined that the SN was a likely black hole, the first one with a known birthday. So much

publicity came my way, starting with Dr. Peter Edmunds, of the CXC phoning me for the first of two interviews. It was an exciting time.

The American Association of Variable Star Observers issued this supernova-monitoring chart soon after the 1979c discovery. Note that at that time, they were still issuing hand-drawn charts.



Jay and Liz Thompson: LVAS Observers from Nevada

We observed M100 from the dark skies of Meadview, AZ and from a more light-polluted sight at the edge of Henderson, NV.

Through a 17-inch Newtonian reflector, M100 showed up well at 125X and 227X. The spiral structure was evident at both magnifications.

From Henderson with a 16-inch f/10 SCT at 254X, the core was evident with a glow surrounding it. There were only hints of spiral structure.

The best views were with a 24-inch Newtonian reflector from Meadview, with a very dark sky and M100 about overhead. At 283X, the spiral arms were well defined. The nucleus

was compact but definitely non-stellar. There was a star following the galaxy at its edge and one preceding a little to the south.

To the north of M100 and following, two stars pointed toward the core. About one third of the way from these two stars to the core of the galaxy and preceding, we saw a satellite galaxy (NGC-4323). We also saw two very small faint stars on the preceding north side of M100.

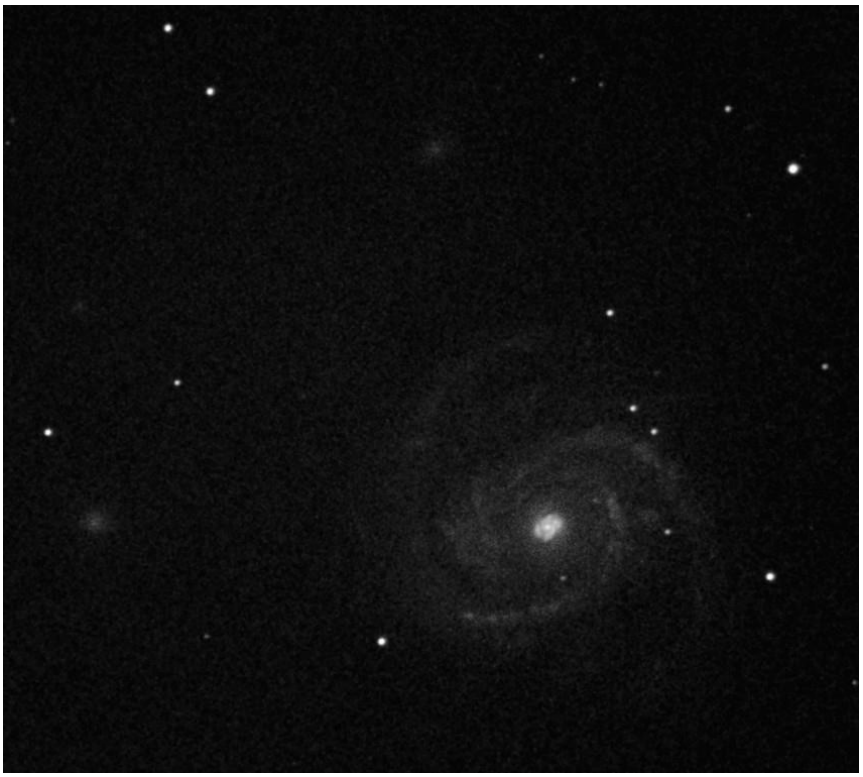
Still at 283X, we also saw a haze (a second satellite galaxy, NGC-4328) south of the bright star following M100. At 530X, we could still see NGC-4328, perhaps a little more distinct. Also we could see three dim little stars on the preceding edge of M100. These stood out well. At 530X, the arms were less well-defined than at 283X.

At 119X, the core of M100 stood out nicely and there were hints of spiral structure, though not as evident as at higher magnification.

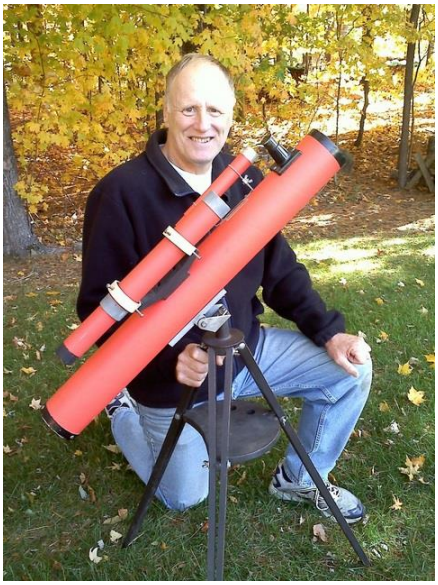
At 156X, we observed NGC-4328 and NGC-4323. The spiral structure was still not as well defined as at higher magnification. There were hints of a spiral arm connecting out to NGC-4323, but the glow was very faint. No connection was visible to NGC-4328.

After the Moon had risen and M100 was more toward the Las Vegas skyglow, M100 was much less impressive than earlier in the night. At 283X, the central core was visible but we only saw the arms with difficulty.

We imaged M100 with a 14-inch SCT from Henderson. Exposure time was 20 minutes at f/5.5. The satellite galaxy NGC-4323 is above M100, while NGC-4328 is to the left. We saw more detail in M100 with the 24-inch from Meadview than what's imaged in this relatively short exposure from a moderately light-polluted sight.



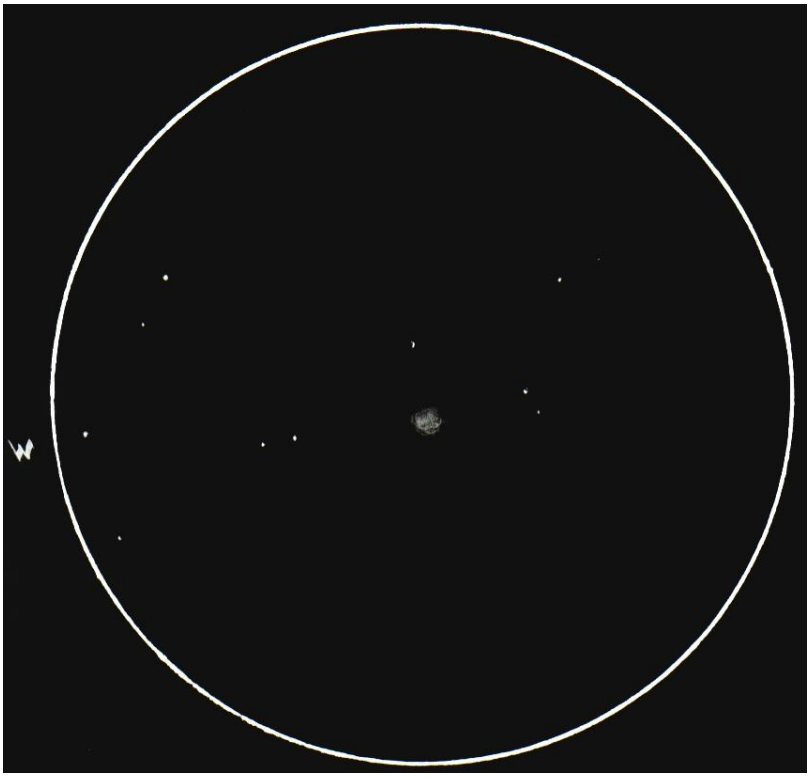
Glenn Chaple: Observer from Massachusetts

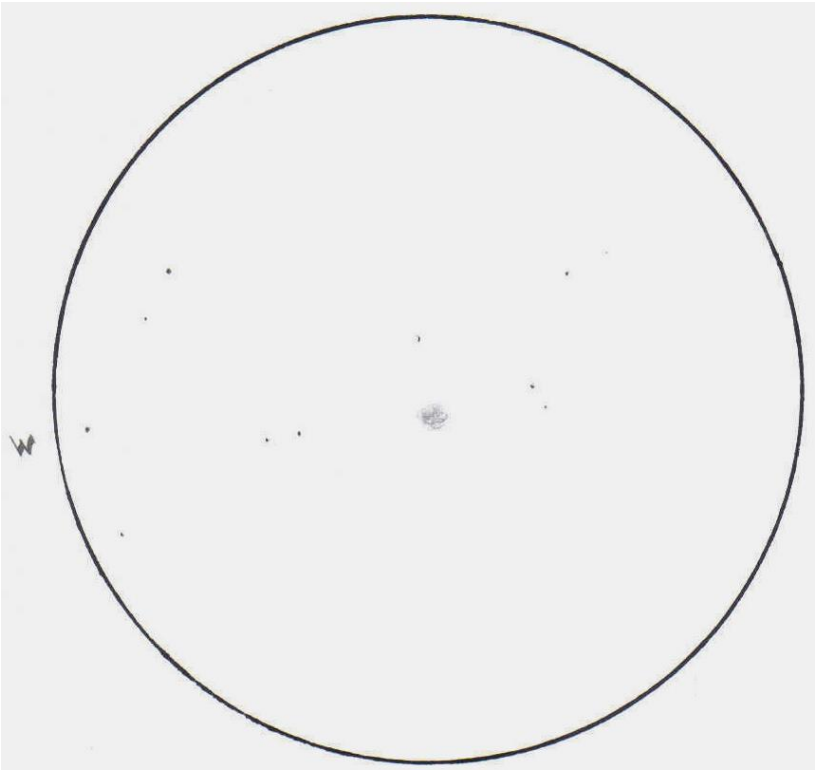


I first saw M100 with a 3-inch f/10 reflector at a magnification of 30X on the night of April 2, 1978. I wrote, "Large and roundish. Relatively uniform brightness. Not bright, but easy with averted vision." This and other Coma/Virgo galaxies I viewed that night I found with the use of Astro Cards, which I still use to this day.

My second observation, from which I made a sketch, was on the evening of April 14, 2013 with a 4.5-inch f/8 reflector at 57X as part of a Small-Scope Messier Survey I was conducting (refer to attached sketch).

I've also viewed M100 very quickly during Messier Marathons and briefly through an 18-inch Dob early last month. The limiting mag. was 5, and I was able to make out a bright nucleus, which I hadn't seen with the smaller scopes.





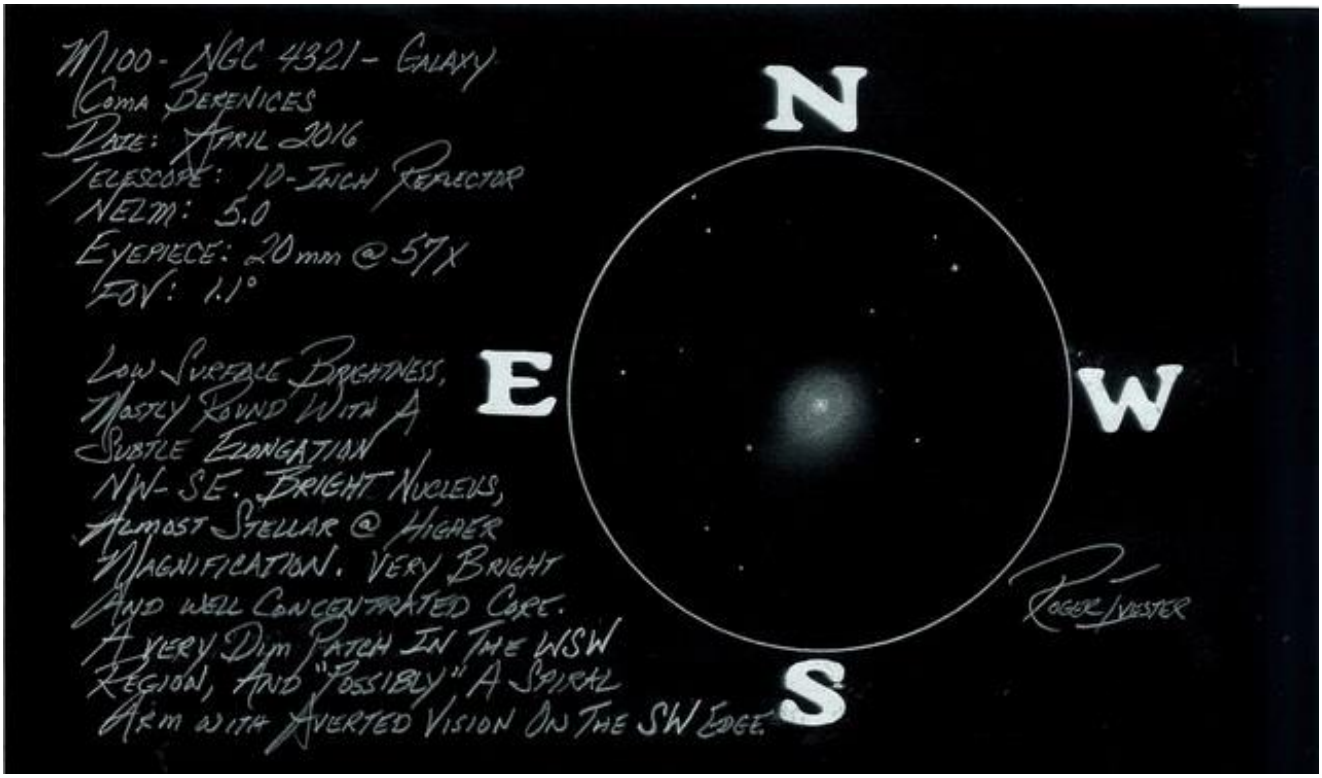
Roger Ivester: LVAS Observer from North Carolina

In April, 2016, I observed M100 with my 10-inch reflector from my backyard. The NELM was 5.0. AT 57X, my field of view was 1.1°.

After more than 30 years of observing galaxy M100, I was finally able to see a bit of detail. One being an "almost stellar nucleus" a hint of a spiral arm on the SSW edge, a brighter patch just to the NW of the nucleus, and a slight NW-SW elongation.

I feel sure that if observed from a darker site than my backyard, much more detail would have been revealed. However, I've always wanted my observations to be from a location that would be consistent with the location that most amateurs observe from.

Description: Low surface brightness, mostly round with a subtle NW-SE elongated halo. Bright nucleus, almost stellar at high magnification. A very dim patch W of the core and a hint of a spiral arm on the SW edge.


M100 - NGC 4321 - Galaxy
Coma Berenices
Date: April 2016
Telescope: 10-Inch Reflector
NELM: 5.0
Eyepiece: 20mm @ 57X
FOV: 1.1°
Low Surface Brightness,
Mostly Round With A
Subtle Elongation
NW-SE. Bright Nucleus,
Almost Stellar @ Higher
Magnification. Very Bright
And Well Concentrated Core.
A Very Dim Patch In The WSW
Region, And "Possibly" A Spiral
Arm With Averted Vision On The SW Edge.
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Roger Lvester

Fred Rayworth: LVAS AL Coordinator and Observer from Nevada

Though I've seen M100 many times, for the Challenge, I wanted to get a fresh look. In the process, I bagged two new galaxies along with the edge-on NGC-4312, which I've seen before as well. I had a long dry spell, not having gone out since February 2016. Since I was expecting better luck than that, I never looked at it back then, also given sky conditions that night in Death Valley. I finally found a great night at Cathedral Gorge State Park in central-eastern Nevada at an altitude of 4,800 feet. Unfortunately, the trip was cut short by a bad power supply in our new travel trailer. However, that one night I got bang for my buck with a batch of Herschel 2,500's as well as all the Challenge objects through August.

The night was supposed to be fully transparent according to the Clear Sky Clock and that was only partially true. As the night wore on, I watched as the brighter stars started clean, but slowly developed nebulosity that wasn't supposed to be there. This is really getting old! However, the hot evening cooled off and became much darker than I'd ever get around Las Vegas. The faint fuzzies popped out more and more. Outside of an occasional zephyr that once in a while turned into a full-on gust of wind, the night was close to perfect. I would've stayed longer, but I never got a good nap due to the electrical issue interrupting my sleep. I had to give up my searching and 1 AM and call it an evening. It was still a very productive night and I detected one Herschel galaxy down to mag. 15.

Despite the transparency issues, which were erratic by the way, I had almost ideal conditions to not only get a great observation of M100, but the surroundings as well. While I was able to find two of the nearby galaxies that I haven't seen before, there were two more that were invisible, beyond my threshold, possibly due to transparency, surface brightness, or a combination. They were galaxies IC-783 at mag. 14.6 and UGC-7425 at mag. 14.9. Oh well…

As for what I *did* see…

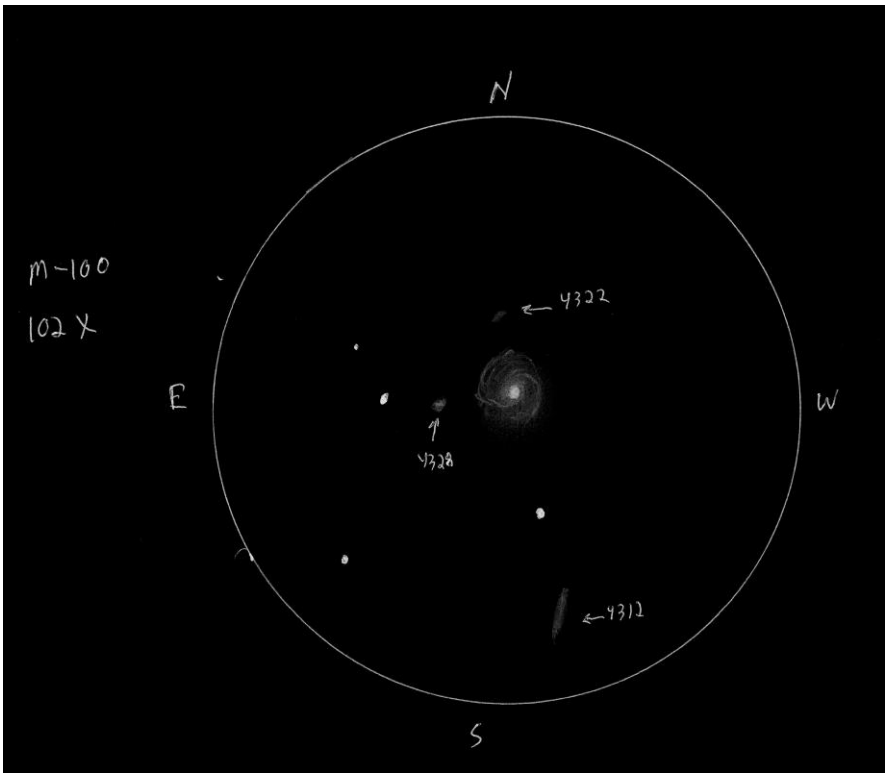
No, I did not see Gus Johnson's supernova! Long gone by now. However, at first blush, I saw a medium-sized round, almost oval blob with a bright and broad stellar core. After staring at it with first, direct vision and then sweeping around with averted vision, the details crept in. Mind you, this was all at 102X. I used an 82 degree field EP and I was easily able to get in the edge-on NGC-4312 as well as the two companion galaxies, which I'll get to in a moment.

Upon sweeping my eye around the core and periphery of the galaxy, I detected a faint spiral shape going counterclockwise. At first I got the impression of three maybe four arms, but after careful checking, looking away, and rechecking, I only counted two large arms growing off the axis. It was quite a task to verify how many arms I actually saw because the strain of seeing them at all gave the impression of more than was actually there. Overall, this galaxy showed me more spiral structure than the great spiral in Andromeda normally does on any given day (though I've seen structure on occasion there as well).

Now, as for the two very tiny and faint companion galaxies. They were very faint oval smudges. To me, NGC-4328 was the easiest to see. It was oval, but almost round in appearance. No matter how much I looked there and away, or even directly, there was no mistaking it. Now, as for NGC-4322, it was more elusive, even though they're listed as the same mag. I had to strain to see it at all. When I did, I swept it with my eye and it would pop out as a faint oval smudge, more flattened than 4328. I left it alone several times and when I came back to it, I'd see it right away but then it would fade away after looking at it too long.

Now, as for NGC-4312, this was a very easy streak with a slightly mottled edge to it. No stellar core, just a streak with a ragged edge.

Overall, it was nice to get four for the price of one.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