

MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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&

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M98 – NGC-4192 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.

M98 – NGC-4192 Galaxy In Coma Berenices

M98, also known as NGC-4192 is an intermediate spiral galaxy of the SAB(s) ab type, located in Coma Berenices. It was discovered by Pierre Méchain on 15 March, 1781. On 13 April, 1781, Charles Messier added it to his catalog as M98. It's sometimes called the Mussel Galaxy and lies approximately 44.4 million light-years distant.

It's a member of the Virgo galaxy cluster group and shines at a moderately dim mag. 11.0, or thereabouts, depending on the source. However, the surface brightness, abbreviated as "Sb" is a much dimmer mag. 13.8, so this galaxy is quite sensitive to weather and light pollution. It can be quite a challenge for smaller scopes, but under dark conditions, can be seen even in the smallest scopes. On the other hand, it can be a significant challenge even for larger scopes on less than ideal evenings.

Observations/Drawings/Photos

Chris Elledge: Observer from Massachusetts



On May 20, 2017 at 10:30 EDT, from the ATMoB Clubhouse, I observed M98 with a 10-inch f/5 reflector. Sky conditions were as follows. Transparency: good. Seeing: average. Bortle scale: 6. NELM: 5.

I managed to locate M98 after several minutes of star hopping from Denebola in Leo. This is the first Deep Sky Object (DSO) that I've attempted on my own with a non-goto telescope. It was quite a challenging learning experience. The galaxy didn't jump out at me after initially finding the surrounding star pattern, so I doubted myself for a while until I finally spotted it.

I found that my 25mm eyepiece presented the best view at 51X, with a 1.38° FOV. Using direct vision, the core of M98 showed as a faint glow. Viewing with averted vision, I was able to see a thin elliptical patch aligned with of a chain of three stars to its SE and two stars to its NW.

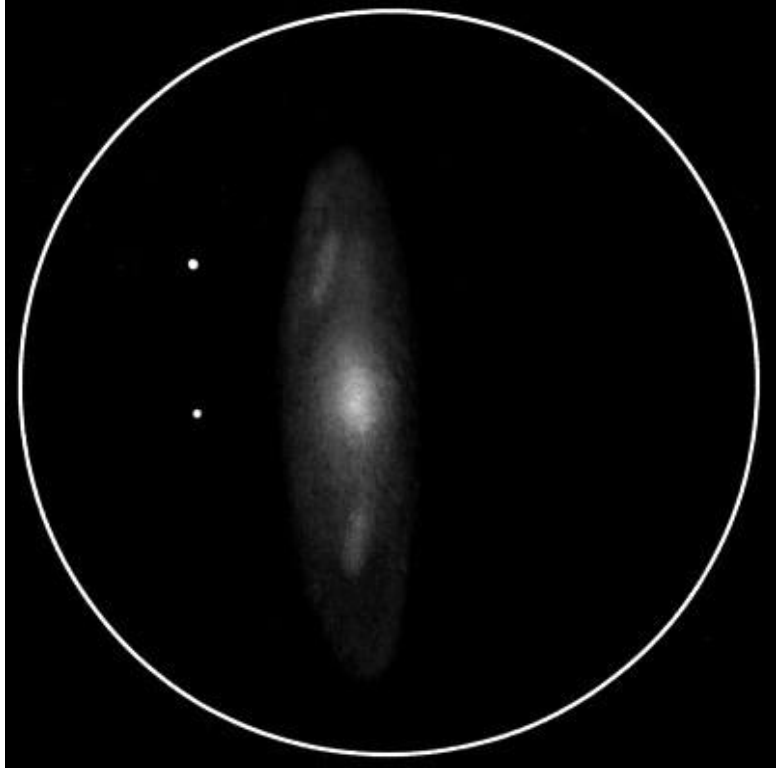
In addition, a bright mag. 5 star, 6 Comae Berenices, lies 1/2° due east of the galaxy.

Jaakko Saloranta: Observer from Finland



M98 is the second faintest object in the entire Messier catalog only preceded by M91 (only 0.1 mags. fainter). With a visual mag. of 10.1 and a surface brightness of roughly 13.5, it can be a fairly difficult catch under light polluted skies.

Observing in a suburban location, I could barely make out M98 with a 4.5-inch telescope as an elongated galaxy with a brighter core. With a 10-inch Dobsonian and high magnification under a dark sky, I could make out some structure from the mottled disk. I described the object as follows, using magnifications between 60X and 343X: “Elongated in NW-SE direction. Bright core with a nearly stellar nucleus in the middle. Two spiral arm stubs visible, the southern one being slightly brighter. Some dark markings near on the NW side of the galaxy, but too difficult to sketch properly. With a bit of a stretch, the galaxy is 5’ X 2’ in size.”



David Eicher: Editor – Astronomy Magazine and Observer From Wisconsin

“M98 (NGC-4192) is an elongated nearly edge-on type Sb spiral, measuring 8.2' X 2.0' and shining at mag. 11.0. This galaxy's surface brightness is rather low, making it a tricky object at high power. Backyard telescopes show this galaxy as a thin streak of greenish light, slightly curved, showing a faint envelope of gas and a sharp nucleus.”

Gus Johnson: Observer from Maryland



In May, 1967 I used a 6-inch reflector @59X. M98 was large, elongated, located $1/2^\circ$ east of the mag. 5 star, 6 Coma.

In 1991, using a 3-inch reflector @39X, it was large, elongated and diffuse.

In 1992, with poor transparency ~ 4.0 NELM, using a 60mm (2.4-inch) refractor @21X, couldn't see it.

In 1993, using 12X50 binoculars, couldn't see it. However, I did see galaxies M99 and M100.

Gary Ahlers: LVAS Member and Observer from Nevada



M98, or NGC-4192 is an intermediate size spiral galaxy located in the constellation Coma Berenices, 6° East of Denebola. It's one of the named galaxies - "Mussel Galaxy". The negative image shows why this was an obvious choice. Stats are listed on the image. While the core's quite bright, the surface brightness is down at mag. 13.6.

This galaxy is at a high inclination of 74° to line-of-sight. The arms are tightly wound near the center with good luminosity in the outlying arms, but no visible dust lanes. The striking feature is that the arms revolve in different planes around the core.





Keith Caceres: LVAS Member and Observer from Nevada



M98, also known as NGC-4192, is a nearly edge-on spiral galaxy in the constellation Coma Berenices. It's 44 million light-years from Earth and is part of the Virgo Supercluster. It's listed as a mag. 10 or 11 object, depending on the source. In the photo, we can see a distinct bright core with two wavy spiral arm structures extending from it in a lazy 'W' fashion. We can also see two distinct disks. A brighter inner disk encompassing the arm structures, and a larger fainter outer disk that's less symmetrical, with lobes on the upper right and lower left of the galaxy.

NGC-4192 has two visual subcomponents. Both are far more distant spiral galaxies that aren't gravitationally associated with it. They're NGC-4192A, which appears as a faint gray smudge below and to the left of M98 (see annotated photo). This is a mag. 15 spiral galaxy that's 110 million light-years away.

The second subcomponent is NGC-4192B (also known as NGC-4186 on its own). NGC-4192B is almost in line with M98's long axis and is to M98's left (see annotated photo). Surprisingly, at mag. 14, this spiral galaxy is significantly brighter than NGC-4192A, even though it is an astounding 380 million light-years distant! An aside — this makes it by far the most distant object I've tried to photograph, so far. Unlike the A component, we can make out a distinct bright core and faint outer disk in the B component, though the individual spiral arms can't be resolved.

The photo itself was taken on the evening of May 19, 2017 (early morning May 20th), at Cathedral Gorge State Park in rural Nevada, during our "Spring Fling" star party. The photo is a cropped unprocessed single 60-second exposure taken at ISO 6400 on a Canon 70D DSLR. The camera was at prime focus behind an f/6.3 focal reducer, shooting through an 8-inch SCT. Plate

solving indicates it has a 38.2 X 25 arc-minute field of view, with an image scale of 1.01 arc-seconds/pixel.





Dr. James Dire: Observer From Hawaii



M98 is a mag. 10.1 barred spiral galaxy in the constellation Coma Berenices. The galaxy is located 6° east of the star Denebola. The galaxy is $1/2^\circ$ west of the mag. 5 star 6 Comae Berenices. M98 measures 10 X 2.8 arc-minutes in size.

It's a nearly edge on galaxy, inclined 74° to our line of sight. The galaxy has tightly wound spiral arms with a chaotic disk and an active nucleus. Distance measurements range from 44 to 66 million light-years. It's thought to be a member of the Virgo galaxy cluster. The galaxy may have interacted with M99 750 million years ago, which may account for the distortions in its disk.

Pierre Méchain discovered M98 in 1781, confirmed later that year by Charles Messier. Messier added M98, M99 and M100 into his third catalog immediately before publishing this final edition of his famous list. M98 is one of the faintest objects in Messier's Catalog.

M98 is one of the few galaxies with a blue shift, meaning it's approaching us. This motion may be temporary if M98 is orbiting the Virgo Cluster. It may be at a point in its orbit where it's approaching us. If its gravitationally bound to the cluster, it'll never reach us.

I viewed M98 in a 6-inch refractor. The galaxy definitely was elongated and nearly edge-on. No dust lane was visible and the core appeared much brighter than the galaxy's edges.

My image of M98 was taken with a 10-inch f/6.9 Newtonian with an SBIG ST-2000XCM CCD camera. The exposure was 200 minutes. I would've preferred a much longer exposure to bring out more detail on the edges of the galaxy and may gather more data on it in the future. The brightest star in the image, located near the bottom left edge, is mag. 11.7. The four stars just off the left edge of the galaxy are mags. 12.5, 15.2 16.5 and 18.

On the image, note the bright star-forming region on the bottom (south) edge of the disk. The spiral arm edge visible on the top (north) side of the galaxy has bright HII regions with bright star clusters. Even with this small telescope, I was able to capture the distortions on the north edge of the galaxy's disk. It appears like the galaxy has two disks that are slightly misaligned with each other. This was either caused the interaction with M99 cited above, or two galaxies have merged to create the presently seen M98.



Joseph Rothchild: Observer from Massachusetts

I observed M98 in dark but hazy skies on Cape Cod with a 10-inch reflector at 87X. I easily found it with a Telrad offset from 6 Com. It appeared as an oval patch elongated with approximately 1:4 ratio. The galaxy appeared uniform without internal details.

Glenn Chaple: Observer from Massachusetts



I first viewed this galaxy on April 2, 1978, using a 3-inch f/10 reflector at 30X. I wrote in my logbook: “Very faint, but loomed large with averted vision.” On both occasions, M98 was located with the help of an Astro Card.



Jay Thompson: LVAS member and observer from Nevada



From our backyard in Henderson with a 10-inch f/4 Newtonian, I found M98 by star hopping from Denebola to 6 Com, which is close to M98. It showed up as a large glowing elongated area at 114X. It wasn't visible (at least initially) in a 21mm eyepiece, giving 48X, due to the bright sky. After looking at 114X, I could see it in the 21mm eyepiece.

With a 16-inch SCT, from our backyard, in a 40mm eyepiece giving 102X, the galaxy was visible as a large elongated glow. In the 26mm eyepiece, giving 156X, a couple dim stars appeared around it and the disk was still elongated. On the following side, it seemed a little darker, perhaps a dust lane. For the most part, M98 was pretty washed out this close to Las Vegas.

From Cathedral Gorge with the LVAS 24-inch Newtonian, M98 showed up in the 21mm eyepiece (giving 116X) as an elongated galaxy with a star-like nucleus. I noted some mottling at this magnification. Increasing magnification to 277X by using an 8.8mm eyepiece, I spotted a concentrated central core and the mottling of the disk was still evident. With averted vision, it took up over half the field of view. There was a darker area to the north of the central condensation. There's also a fairly bright star following off-center and a dimmer one following near center.

Sue French: Observer from New York



“Although M98 has low surface brightness, it can be seen in a 60mm (2.4-inch) refractor under dark skies. Through a 105mm (4.1-inch) scope at around 100X, the galaxy is about 6' x 2', elongated N-NW to S-SW. It contains a brighter, extended patchy core and an off-center, nearly stellar nucleus.” Sue French – New York – *Deep-Sky Wonders*.

Mario Motta: Observer from Massachusetts



Sending an older image as that's what I have. If the monsoons ever end up here, will redo, as I know I can do much better than this early image of mine.



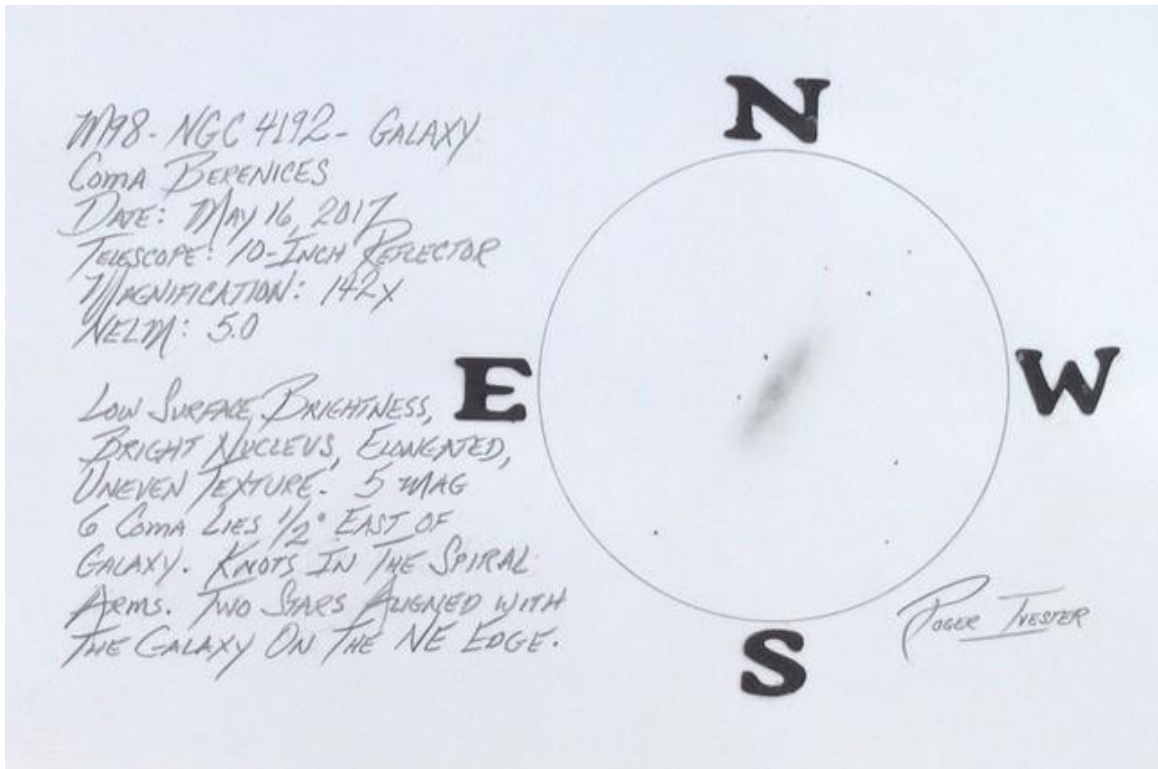
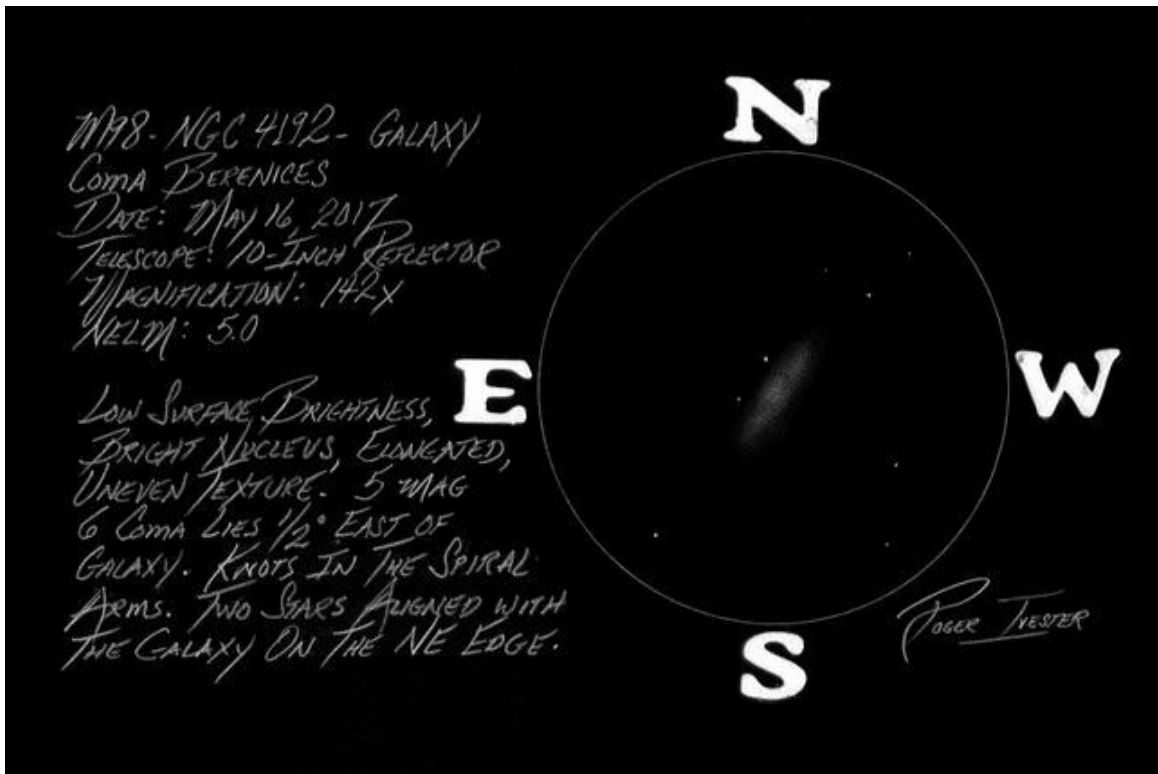
Roger Ivester: LVAS Observer from North Carolina



M98 is one of the fainter of the Messier objects and can be especially difficult when observed with a telescope smaller than 4-inches. The surface brightness is very low, and regardless of telescope size, a dark sky is needed to see and fully appreciate the many faint, but fine details this galaxy has to offer.

In a 10-inch reflector, M98 appeared fairly bright, elongated, a bright nucleus, with unevenness in the halo, and I noted some mottling in the central region. I saw two brighter sections in both the NW and SE arms. The nucleus was off-set toward the SE.

With a 102mm (4-inch) refractor, and observing from my moderately light polluted backyard, this galaxy appeared very faint, elongated and weak without any center brightness. In a 6-inch reflector, the galaxy was slightly enlarged and overall a bit brighter when compared to the refractor.



Fred Rayworth: LVAS AL Coordinator and Observer from Nevada



I've observed M98 multiple times over the years, but for the Challenge, I took special care to observe it from first, Redstone Picnic Area at Lake Mead on April 29, 2017 and Cathedral Gorge State Park on May 20, 2017.

On April 29, 2017, at 2,100 feet, it was cool, but extremely clear. It started gusty, but calmed down as the night wore on. The moon was a sliver but it didn't end up being a problem because the sky was so clean, it never caused any skyglow. A great night for galaxies.

At 102X, the galaxy was medium-sized and grainy and a fat oval. It was sort of flattened on one side and with a stellar core. There was a line of three uneven mag. stars near one edge.

On May 20, 2017, at 4,800 feet, this was the second night there and it wasn't near as good as the previous evening. It was warmer and calm, with occasional air movement. Puffy clouds moved through like the night before and hopefully, they'll stay away. Unfortunately, though conditions were similar to the night before at first, by 11PM, the clouds moved in in waves and never left. Packed up for the evening instead of chasing holes. In the morning, I woke up to basically overcast skies, so it was a good call to not wait it out the night before. As it was, I managed to get a good observation of M98 amongst many other objects.

At 102X again, my usual working magnification, the galaxy was a distinct oval with mottling and a lumpy core. Plenty of detail including a slight hint of spiral activity. That same line of uneven mag. stars I saw before was there, off to the northeast. I spent some time trying to see more of the evident spiral shape, but outside of eye strain, it broke down to more of a dense core and mottling rather than spiral arms. I could just get a hint of something with averted vision, but it was fleeting at best and not constant or there with direct vision. A lot of the details disappeared with just someone passing by with any kind of light, be it any color at all. This was

one tough galaxy to eke out details. I never saw a hint of the other two galaxies Keith Caceres mentioned, though to tell the truth, I wasn't actively looking for them because I didn't know they were there to look for to begin with. If I did, maybe I would've seen something, maybe not.

My drawing doesn't show as much detail as I saw in the eyepiece.

