MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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&

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Spring 2010

M-51 – NGC-5194/5195 The Whirlpool Galaxy

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.

M-51 – NGC-5194/5195 The Whirlpool Galaxy

Known also as the Whirlpool Galaxy or NGC-5194/5, it is a spectacular object to observe. With a mag. 8.4 brightness, it is easy to spot in most any telescope and even binoculars. However, the larger the aperture, the more details can be seen within it.

It was discovered by Charles Messier in 1774, but the spiral shape was not recognized until Lord Rosse trained his leviathan 72" reflector on it from his observatory at Birr Castle in Ireland. It was still thought to be a spiral nebula until modern astrophotography revealed its true nature.

Though its companion, NGC-5195, is a separate galaxy, it has long interacted with the main galaxy to affect how the spiral arms formed. This smaller companion has collided with the main galaxy several times and is currently behind it as referenced from Earth. Visually, in smaller apertures, two bright spots can be seen with one a bit larger and brighter than the other. However, they are both connected within the glow.

M-51 is part of the small M-51 galaxy group that includes M-63 (the Sunflower galaxy), NGC-5023 and NGC-5229. The Whirlpool Galaxy lies about twenty-three million light-years from Earth.

Observations/Drawings/Photos

Roger Ivester: Observer from North Carolina

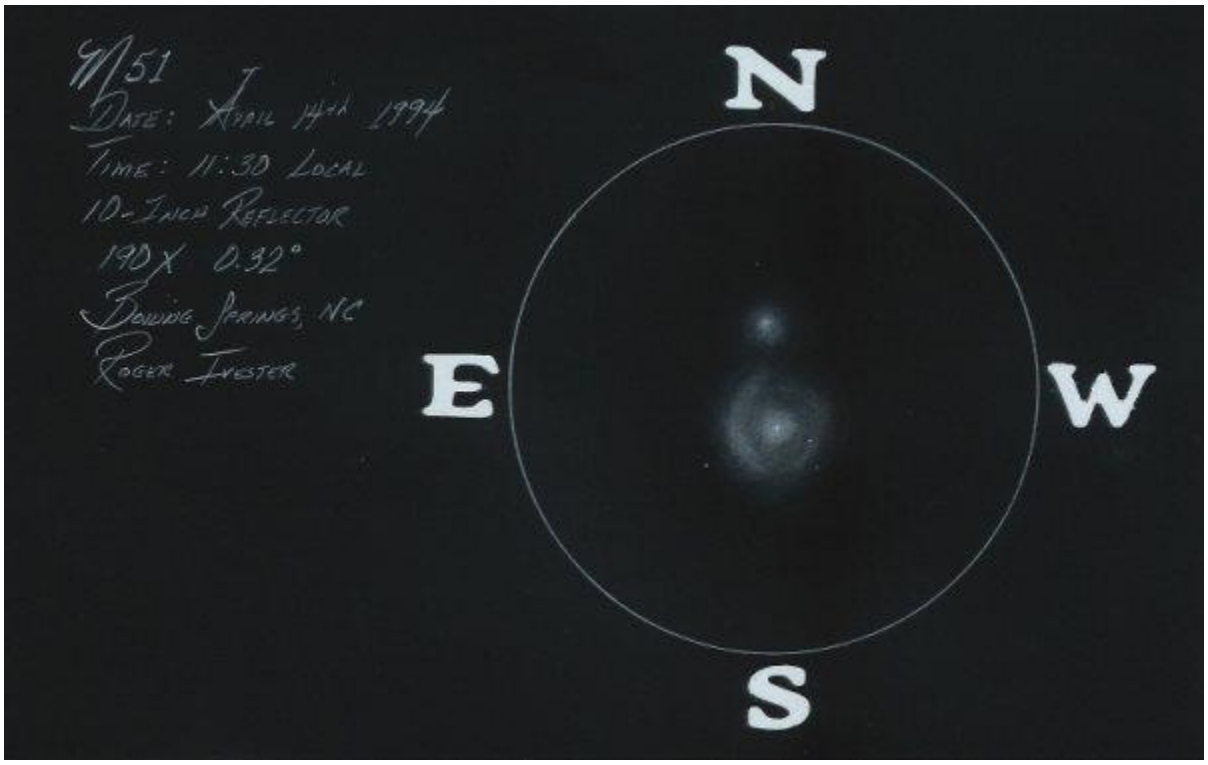
The spring supplemental Observers Challenge object is NGC-5194 (M-51) and its smaller companion, NGC-5195, which lies only 4' to the north. All observations were made from my moderately light-polluted backyard in Boiling Springs, North Carolina.

Both galaxies could be easily seen with a 60mm (2.4-inch) scope under a dark sky and good transparency. The appearance was that of two faint nebulae, both with brighter cores, each having a stellar nucleus, with faint mostly-round halos.

A 4-inch refractor presented NGC-5194 as having a brighter well-concentrated middle and a stellar nucleus. The eastern-most part of the halo had a brighter rim and curved from the south edge toward the north. The western halo appeared similar, but was not as bright, nor nearly as concentrated. NGC-5195 appeared mostly round with a brighter middle, and also with a stellar nucleus, which seemed to be a bit more intense in brightness than the nucleus of the larger NGC-5194.

When observing NGC-5194 with a 10-inch reflector, the spiral arm on the western edge became very pronounced, and the overall texture began to hint at spiral structure. A mag. 13.5 star could be seen just off of the western edge of the core, and a fainter mag. 14 star sat just below. A mag. 13.7 star could be seen on the eastern edge of the halo. NGC-5195 was presented as smaller, but again with a brighter stellar nucleus as compared to the larger NGC-5194.

The sketch was made using a 10-inch reflector at a magnification of 190X. Due to the poor conditions as of late, I picked a sketch from April 1994 and duplicated it as close as possible. This sketch was made on a 5 X 8 note card, using a combination of different graphite drawing pencils. The colors have been inverted using a scanner, and there were also some changes in contrast and brightness.

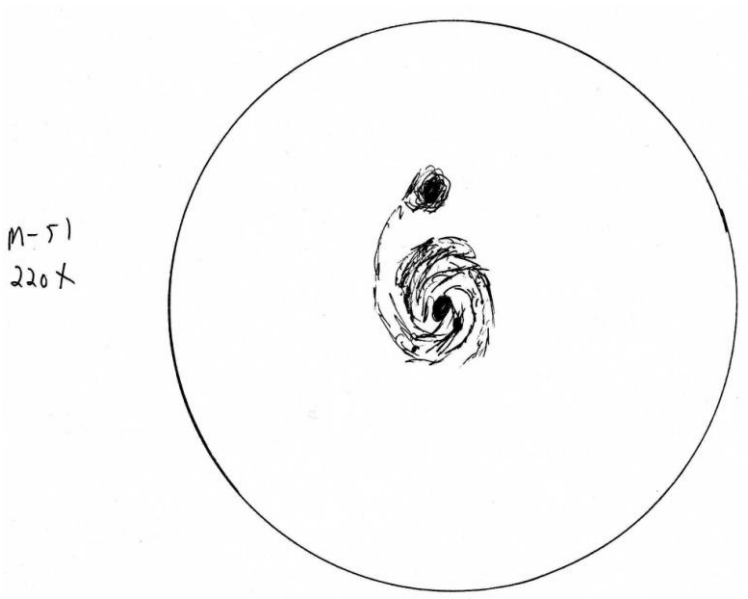


Fred Rayworth: Observer from Nevada

I had two opportunities to look at this great galaxy pair for the spring supplemental. Once in May and the other in June. Below is a summary of the two observations, both made with a 16-inch f/6.4 Dobsonian reflector.

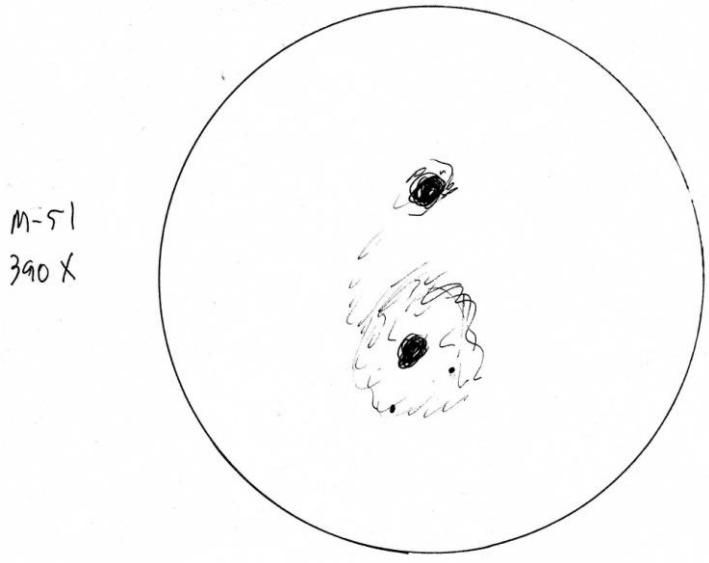
I saw it both times from Redstone Picnic Area on the north shore road of Lake Mead, Nevada. On May 15, 2010, what started as a bad night (clouds moving in before sunset) opened up after dark and became the best observing night of 2010, so far. The sky was pristine, at least wherever I looked. There was no wind and I remained in a T-shirt the whole night.

At first glance, I was wowed by the stunning detail in the galaxy pair. At 70X, it was small, a pair of bright cores with the larger one having just the hint of spiral arms. At 101X, more details came out as the spiral arms started to show mottling and more structure. At 229X, it was the best. As the spiral arms spread out from the bright and large non-stellar core, I spotted individual lumps of nebulosity and what may have been some globular clusters embedded within. A faint bridge connected to NGC-5195. As for NGC-5195, the core seemed almost as bright as that of M-51, but the surrounding glow was much smaller and just a tad oval. It had no other shape and I thought it to be distinctly of the elliptical variety. It was quite a contrast to the extended spiral arms of M-51. Overall, I got the impression that M-51 was spinning so fast, it threw a large chunk off to the side and it was still connected. This is not likely the case, but it set my imagination wild.



Upon a return visit on June 5, 2010, the skies weren't quite as nice, there was an erratic breeze blowing, and I was tired the moment I got there. Still, I had a great time and had a chance to try a new 4.7mm eyepiece (390X) on it.

At 70X, 101X, and 229X, I observed the same details as the last time though they were not quite as distinct. When I tried 390X, the image filled the field. Both cores looked equally bright, though M-51 was a bit larger. The spiral arms washed out so that only the brightest clumps were visible, vaguely giving it a spiral appearance. The bridge between M-51 and NGC-5195 was gone. Though the new eyepiece gave a nice 82° field of view, the magnification was just too high for the conditions and didn't add much. Overall, they looked like a pair of bright cores with "something" around one of them.



Rob Lambert: Observer from Nevada

In doing research for the Spring Supplemental Challenge, I was really surprised by the number of differing estimates regarding M-51's distance, its size, and its brightness. Differences varied from 15 million light years to the more accepted 37 million light years. Estimates of its size varied from 50,000 light years to over 100,000 light years. Estimates of its luminosity ranged from 10 billion suns to over 160 billion suns. It's amazing that estimates can vary this greatly.

From this observer's standpoint, M-51 is one of the most intriguing objects of the night sky. It's always a favorite of the public at our Education Outreach events. The Mallincam is able to reveal much detail in M51's structure.

Both M-51 and its companion, NGC-5195, located to its north, have very bright cores. M-51 has a definite fairly well-defined spiral structure while the companion appears to be somewhat irregular, probably from the destructive interaction with M-51. The Whirlpool has two tightly wound spiral arms that appear to originate opposite each other on the east and west sides of the core. Both arms wrap more the 360° around the galaxy. The arm that originates on the west gradually thins out and fades into space on the south side of the galaxy, while the eastern originating arm reaches out and seems to encompass NGC-5195. There is an obvious dust lane interior to the arm that forms the bridge between the two galaxies. The dust lane makes NGC-5195 appear to be below the bridge, which is supported by some of the research observations I reviewed in preparing to observe this object. Other dust lanes are obvious throughout both arms, but are most noticeable in the eastern originating arm. There also appears to be some knots of stellar activity in the portion of the arm directly between the two galaxy cores. Again, this is most likely due to the interaction between the two galaxies.

M51 and its companion will continue to be a favorite of mine. I look forward to observing and sharing the intriguing views of this beautiful spiral galaxy.

Jim Gianoulakis: Observer from Nevada

The 51st entry in Charles Messier's famous catalog is perhaps the original spiral nebula--a large galaxy with a well defined spiral structure also cataloged as NGC 5194. Over 60,000 light-years across, M51's spiral arms and dust lanes clearly sweep in front of its companion galaxy, NGC 5195. Not far in the sky from the handle of the Big Dipper, they officially lie within the boundaries of the small constellation Canes Venatici.

This image is composed of a stack of 22 light frames and 32 dark frames combined and stacked using DeepSkyStacker. Levels and curves applied in Photoshop.

Dr. James Dire: Observer from North Carolina

M51 is an 8.4 magnitude face-on spiral galaxy in the northeast corner of the constellation Canes Venatici. The galaxy is best found by starting at the star Alkaid (end of the Big Dipper handle) and going 3.5° southwest. The galaxy is approximately 7.8" by 6.6" in size and has great surface brightness for a face-on spiral galaxy. I have seen this galaxy in all size telescopes, the largest being a 25-inch Newtonian at 8,000 ft in Colorado's Pike National Forest. In that behemoth scope, the spiral arms jumped out like a photograph.

My first image of M-51 was taken with a Canon 30DSLR camera attached to a 102mm (4-inch) apochromatic refractor at f/6.3.

The exposure was 30 min. The second image was taken with a 190mm (7.5-inch) f/5.3 Maksutov-Newtonian using an SBIG ST-2000XCM CCD exposed for 40 min

Both images were shot at the Wildwood Pines Observatory in Earl, NC.

M-51 has two spiral arms coming out of the galactic bulge, each branching off into more arms. Detailed structure in the galaxy can be seen in either image, including the bridge of stars connection M-51 to its companion spiral galaxy, NGC-5195.

NGC-5195 is also a face-on spiral galaxy less than half the size and brightness of M-51. However both galaxies' cores have similar surface brightness and are just as easy to spy visually.

Frank Barrett: Observer from North Carolina (*www.celestialwonders.com*)

Frank took an outstanding photo of the pair on 2/20/2010 from his observatory in Gastonia, North Carolina. He used a 10-inch SCT f/11 scope. His exposure time was 2.5 hrs luminance and 1.5 hrs color with a SBIG STL-11000M camera. His mount was a Losmandy G11 w/Ovision worm upgrade.

Buddy L. Barbee: Observer from North Carolina

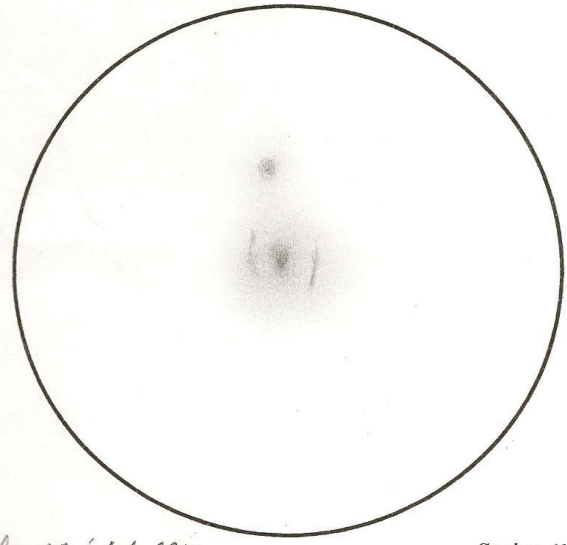
Friday, March 6, 2010 was forecast to be the second clear night of three after a front and rain had come through my area. Our club, the Forsyth Astronomical Society, had a public observing session planned for Saturday night. I met up with two other members of the club to do some observing. They used their 10-inch Dob and I used my 4-inch refractor. The sky was beautifully clear, but the night was very cold.

I've observed M-51 many times over the years with many different telescopes. On this night I chose to use my 102mm (4-inch) refractor (a wonderful instrument) with a 13mm eyepiece for a magnification of 67X. When previously observing M-51 with my 11-inch SCT on a great night, I have seen what appears to be the bridge between M-51 and its companion. With my larger telescopes, which include a 10-inch Dob, a 6-inch refractor and a 125mm (5-inch) Maksutov-Cassegrain, I have been able to see spiral structure and the appearance of a faint doughnut around the galaxy core. I was surprised to see something different this time. There was the bright core of the galaxy surrounded by a faint halo. Then I saw what appeared to be segments of spiral arms on each side of the galaxies' core. NGC-5194, the companion galaxy, was also visible. This was one of my best views that I can remember having of M-51.

DEEP SKY OBSERVATION FORM

CONSTELLATION : Canes Venatici

OBJECT: M51 and NGC 5195



Day & Date: Friday, March 6, 2010
Time (local): 9:45 PM EST
Time (UT):
Observer: BLB
Location: Club observatory

Seeing (1-5): 3
Transparency (1-7): 5
Limiting Magnitude: 5.0
Temp: 37°F Wind: 5-10 mph
Humidity: 41%

INSTRUMENT
Telescope: TV102
Aperture: 4"
Focal Length/Ratio:
Eyepiece: 13mm Nagler
Magnification: 67x
Field of view:
Filter: None

OBJECT
RA: 13 hr. 29.9 min.
Dec: 47 d. 12 min.
Type: SG
Listed Magnitude: 8.2v
Listed Size: 11'x 7'
Altitude of Object: 50° to 60°±

NOTES

In my ETX-125PE the arms almost appear like a dim doughnut around the core of M51, I was supprised to see them as two arcs on either side of the core in my 4" Refractor with NGC 5195 so easily visible.

Steve Davis: Observer from North Carolina

I was playing over the weekend and got this image with a 130mm (5-inch) AP refractor @f/8. Not much, but I thought everyone might find it interesting. It's just been stacked (8X5 min) and stretched. I didn't have time to mess with it much. Now I want to put the CN212 on it and see what happens. I need a new camera!