MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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&

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June 2011

M-102 (NGC-5866) Spindle Galaxy in Draco

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-102 (NGC-5866) Spindle Galaxy in Draco

This M-102 is not the duplicate of M-101 that is common to the original Messier catalog. Many common references list M-101 and M-102 as the same galaxy but in this case, it is NGC-5866, which many consider a better candidate for M-102. It makes for a more complete list even if it isn't necessarily historically accurate. Any controversy aside, this M-102 is and excellent subject. NGC-5866 was discovered by either Pierre Méchain or Charles Messier in 1781. It's one of two galaxies called the Spindle Galaxy (the other one is NGC-3115 in Sextans).

NGC-5866 has an extended dust lane which can be seen edge-on. It's highly unusual for a lenticular galaxy. Lenticular galaxies are galaxies that are between elliptical and spiral galaxies. They have used up or lost most of their interstellar matter and have very little ongoing star formation. There may, however, be significant dust within their disks. This type of galaxy may be hard to distinguish between an elliptical galaxy.

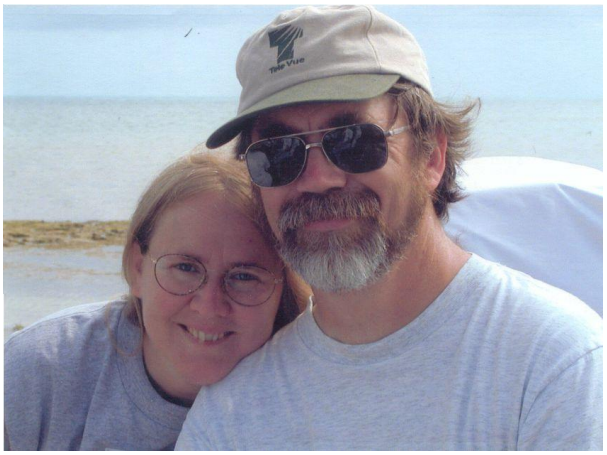
In the case of NGC-5866, it's possible it really is a spiral galaxy misidentified as lenticular because of the acute edge-on angle it is to the Earth. In that case, the dust lane would not be unusual.

NGC-5866 is one of the brightest of a small galaxy group that includes spiral galaxies NGC-5879 and NGC-5907. This group may be a sub-clump of the M-51 and M-101 group, though some think these three groups are separate.

The challenge for the smaller scopes is to see the smudge of the galaxy. For the larger scopes, it is to see the dark lane and more details surrounding it.

Observations/Drawings/Photos

Sue French: Observer from New York



I observed it on many occasions using a variety of telescopes. Here are my notes:

On March 15, 1980, 10:55 pm EDT, I used a 6-inch f/8 Newtonian at 43X. Seeing was fair and transparency was good.

I saw a very faint hazy patch, small, somewhat elongated. Brighter in a large part of the central area. There was a star near the edge.

On May 13, 1991, at 12:00 am EDT, I used 14 X 70 binoculars. Seeing was good and transparency was very good.

It was a quite small, very faint, elongated galaxy. It was near one point of a right triangle of nearly equal magnitude field stars. It shared a field with a bright star in Boötes.

On April 17, 2002, at 12: 05 am EDT I used a 105/610 mm (4-inch f/6) apochromat. Seeing was fair and transparency was fair.

At 27X, it was small, bright, and elongated, with a star at the north side of the northwest end. It was located outside the faintest corner of a right triangle of fairly bright, nearly equal magnitude stars. A bright star was south in the field of view.

At 87X, a fainter star was now visible at the south side of the northwest end. The galaxy runs southeast-northwest with a length-to-width ratio of about 3 to 1. It has a bright elongated core, with some patchiness in the southeast. The length is approximately equal to the distance between the bracketing stars (2.4').

At 127X it had an intermittent tiny nucleus.

On June 13, 2004, at 12:17 am EDT, I used a 10-inch f/6 Newtonian. Seeing was poor and transparency was poor. I was at Indian Meadows where it was also very light polluted.

At 70X it was a nice, bright, oval galaxy elongated 3:2 northwest-southeast. The north end passed between a mag. 11 star (north side) and a mag. 12 star (south side and a little more distant), all along the longest side of a bright triangle of mag. 8, 9, and 10 stars.

At 170X, it was 4' long and one-third as wide. It had a faint halo. It was much brighter, large, and had an oval interior with a small, slightly brighter core area.

Buddy L. Barbee: Observer from North Carolina

This observation was made Friday, April 28, 2011 from my families' beach house at Oak Island, NC. I was using my 4-inch refractor with a 10mm eyepiece. The weather was almost perfect with a clear sky having a naked eye limiting (NELM) of 5.1, but it turned out that the transparency was less than average for this site. It was a comfortable 65° F with winds between 10 to 15 mph, while the humidity was a moderate 55%.

I began my star hop at Edasich, Iota Draco, using a 24mm eyepiece with a magnification of 37X and a true field-of-view of 1.83°. Moving the telescope approximately two and a half fields-of-view to the southwest, I located a small dim hazy spot. After verifying this to be the correct star field with my atlas, I started upping the magnification until I got the best view possible of M-102. After settling on the 10mm eyepiece with a magnification of 88X and a true field-of-view of 0.68°, the galaxy appeared to be a small lens-shaped gray spot that was a little brighter in the center. M-102 appeared to be about 4 arc minutes long by 1 arc minute wide. The galaxy's long axis was oriented a little west of northwest to a little east of southeast. The surface of the galaxy appeared to be mottled a little, and was not a smooth gray misty spot. With the 4-inch refractor, I was surprised by how faint this galaxy appeared.

There were several stars visible around the galaxy. One was a mag. 11.5 star approximately 1 minute to the north of the galaxy's core and another was a mag. 12.0 star approximately1 minute southwest of the galaxy's core. This mag. 12.0 star was only visible with averted vision. There was also a bright mag. 7.5 star located 10 arc minutes to the southwest. Also of note was a mag. 6 star just outside of my field-of-view, approximately 30 arc minutes to the northeast.

DEEP-SKY OBSERVATION FORM

CONSTELLATION: Draco

OBJECT: NGC 5866 / M102

Day & Date: Fri., Apr. 28, 2011
Time (local): 11:45 PM EDT
Time (UT):
Observer: BLB
Location: Beach House, Oak Island, NC

Seeing (1-5): 4
Transparency (1-7): 3
NELM: 5.1
Temp: 65°F Wind: 10-15 mph
Humidity: 55% ±

INSTRUMENT
Telescope: TV 102
Aperture: 4"
Focal Length/Ratio: 880mm f/8.6
Eyepiece: 10mm
Magnification: 88x
Field-of-View: 00° 41'
Filter: None

OBJECT
RA: 15 hr. 06.5 min.
Dec: +55 d. 45.8 min.
Type: Galaxy
Listed Magnitude: 10.2
Listed Size: 4.7' x 1.9'
Altitude of object:

NOTES

This galaxy is approx 4' x 1' in diameter. It appears to be a thin lens shape that is brighter in the center. The galaxy has a Position Angle of approx 130° (a little west of NW to a little east of SE) There is a magnitude 11.5 star NW of the center of the galaxy and a magnitude 12.0 star SW of the galaxies center. The magnitude 12 star was only seen with averted vision. There is also a magnitude 7.5 star located 10' SW of the galaxy.

This galaxy is much smaller and dimer than I expected with the 4" refractor.

NOTE: On June 3, 2011, I viewed this galaxy once again with my 10-inch Dob while attending the East Coast Star Party on the Outer Banks of NC. It was a comfortable 70° F with the wind blowing 5 to 15 mph. The sky was clear with a naked eye limiting magnitude of 5.7.

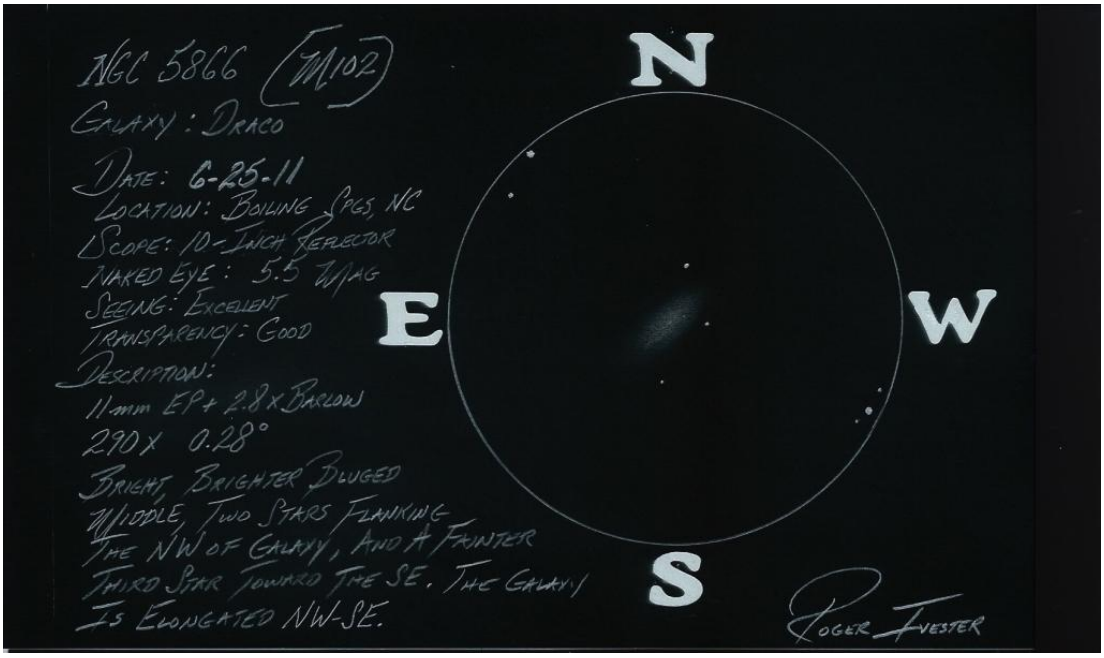
With the 10-inch Dob and a 13mm eyepiece for a magnification of 92X and a true field-of-view of 0.88°, this view was almost identical to the view through the 4-inch refractor. Except for the galaxy being brighter and the dim stars next to M-102 being visible with direct vision, one would think it was the same view. I was trying to see the dust lane with the larger aperture though, so I upped the magnification until I reached 240X with a 5mm eyepiece and still couldn't see it. I guessed that seeing the dust lane will take either darker skies or a larger telescope.

Roger Ivester: Observer from North Carolina

It's been a very difficult spring for observing in the foothills of western North Carolina, due to clouds, rain, and as of late, heat and haze. On the night of June 25, 2011, I was able to observe under excellent conditions using my 10-inch reflector. NGC-5866 was very easy to locate, using low power. The galaxy appeared bright, elongated, with two stars flanking the NW end. When increasing the magnification to 200X and finally 290X, I saw a third, fainter star relatively easy, SSW of the SE end of the galaxy. At the higher magnification, I saw the galaxy as elongated, lens shaped, with a brighter and more concentrated core.

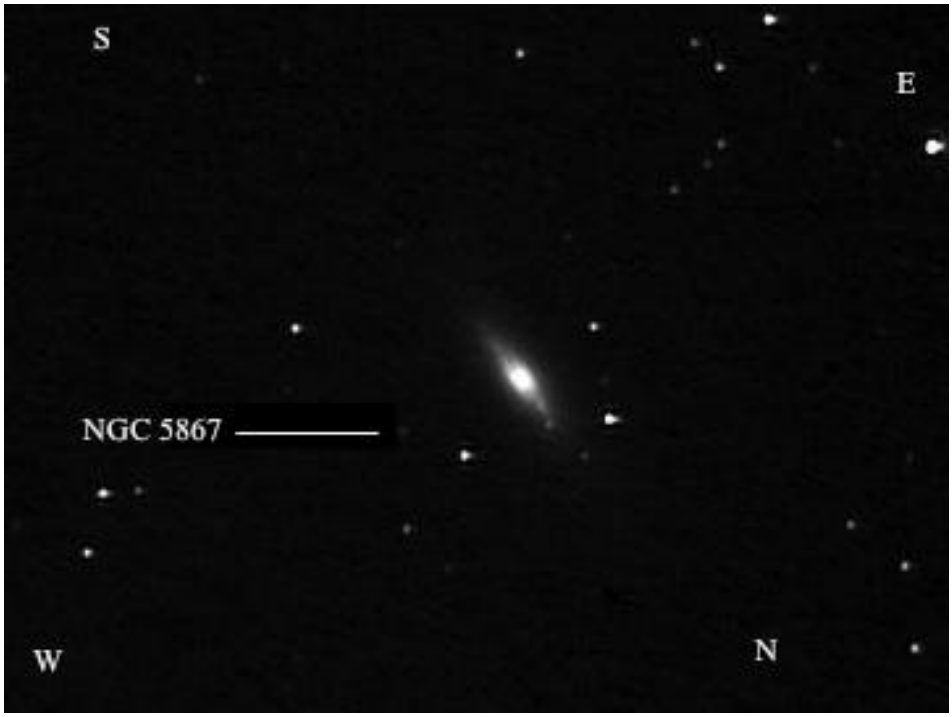
With the use of 200X, I was very surprised to see the faint and small mag. 14.9 galaxy, NGC-5862, located to the SSW of NGC-5866. The fainter galaxy appeared as little more than a faint blur when using averted vision. I could not hold it constantly, with the shape and size being indeterminable.

I made the sketch of NGC-5866 using a blank 5 X 8 note card, with only the use of a No. 2 graphite pencil. I inverted the color for a negative image, using my copier/scanner. I used a magnification of 290X with a 0.28° field of view.



Rob Lambert: Observer from Nevada

My observation of M-102 or NGC-5866 did little to confirm, in my mind, its status as an edge-on lenticular or spiral galaxy. I, too, was torn as to whether it was spiral or lenticular, although it did appear to have more of a halo instead of a disk. However, I didn't think I was imagining the dust lane that was stretching across the center of the central bulge, which was angled somewhat from the southeast to northwest. The galaxy definitely had a central bulge that was much brighter than its' disk/halo. I always have a difficult time determining which way is up when trying to determine the directional orientation of objects, and M-102 was no different. My Starry Night Pro didn't help much either. In fact, Starry Night Pro showed M-102 and NGC-5866 as being different objects, but showed M-102 as being the object I observed. Assuming that I had NGC-5866/M-102 oriented correctly, it appeared to be oriented north-south with north being toward the lower right corner of my image. There appeared to be two foreground stars overlaid on the southwestern end of the galaxy. I was just able to detect NGC-5867 on the western side of M-102's central bulge. I wasn't able to detect any of the many other galaxies that were clearly visible in Hubble images. Although there does appear to be another galaxy visible between the two stars on the eastern side of M-102, I couldn't find a labeled photo that would confirm that it was a galaxy and provide its designation. What I would've given for one of Jim Dire's well-labeled photos of this region of the sky!


S
E
NGC 5867
W
N

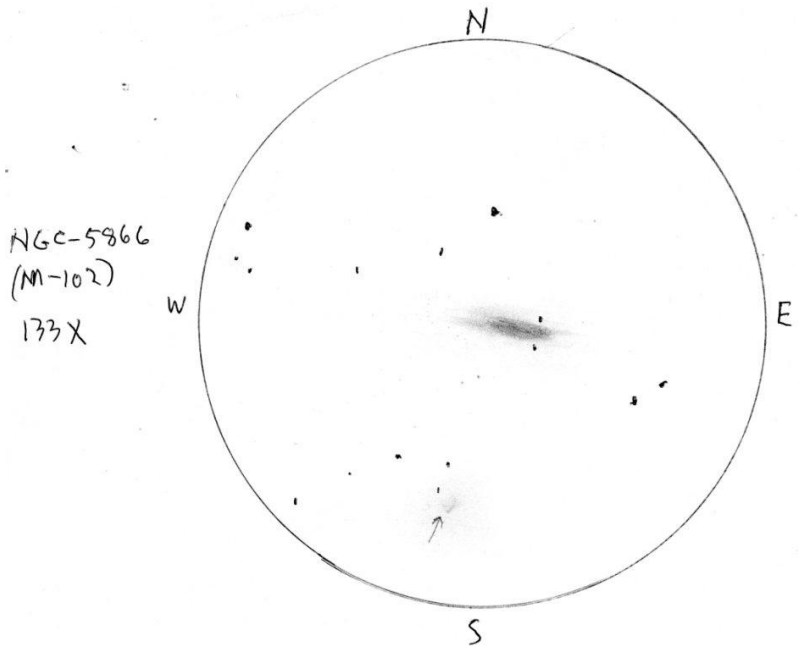
Fred Rayworth: Observer from Nevada

I had two chances to look at M-102 this year, both from Desert Springs Preserve near Corn Creek just north of Las Vegas. Unfortunately, both trips were not under the best observing conditions. The skies were dark but the air was thick with dust. Still, I was able to get two mediocre observations using my 16-inch f/4.5 Dobsonian.

On May 7, 2011 I saw a sharp oval between two stars. I noticed no other particularly distinctive features. The sky didn't lend itself to allowing for detailed observing so I considered myself lucky to see even that much. The galaxy stood out even though the background was bright. I saw it best that night at 86X though I tried 131X and even 229X and neither magnification drew any improvement. I was aware that there might be some fainter stars embedded within the halo but I never saw a hint of them at any magnification.

My second attempt was the evening of July 2, 2011. The sky looked promising but once again, the conditions seemed to be a repeat of the May 7th evening and they proved to be true. By the time the public outreach was over and I was able to concentrate on M-102, the skies were already fading. I saw a clone of what I witnessed in May. However, I seemed to get the best view at 131X this time. The edges of the oval were a bit more defined and filled out more toward the two stars framing it. Because of the wide field of view of the eyepiece, I was able to squeeze in the area where the faint mag. 14.9 NGC-5870 was supposed to be. I looked for the star it sits next to and scanned for it over and over again and spotted just a hint that something was there. However, I couldn't for sure say with certainty that I actually saw it as the background was getting brighter as time wore on. Just in case, I pointed it out in my drawing. I didn't add it to my database as I don't think it was a good enough observation to count. I also tried for the much fainter mag. 15.2 galaxy that lies just north of it but given the brightening sky, there was no way I was going to spot that.

I soon noticed that the brighter stars developed nebulae around them, a sure indication that the monsoon moisture was moving in, even though it couldn't be seen directly. It was time to quit for the night.



Jim Gianoulakis: Observer from Nevada

This month's observer's challenge target is spiral galaxy NGC-5866 in Draco. This object always generates a question among observers. Is this galaxy Messier's 102nd object? That depends on who you ask. Some astronomical historians argue that M-102 is a duplicate observation of spiral galaxy M-101 in Ursa Major. Others say the evidence points to this galaxy, NGC-5866.

Whether or not Messier meant NGC-5866 to be his 102nd entry, this lens-shaped galaxy shows up nicely through a 4-inch telescope as a bright streak with a brilliant center. It shines at mag. 9.9 and measures 6.6' by 3.2'. On the best nights, larger scopes reveal a thin dust lane extending almost as long as the galaxy.

To find NGC-5866, point a scope 4.1° south-southwest of mag. 3.3 Iota (ι) Draconis.

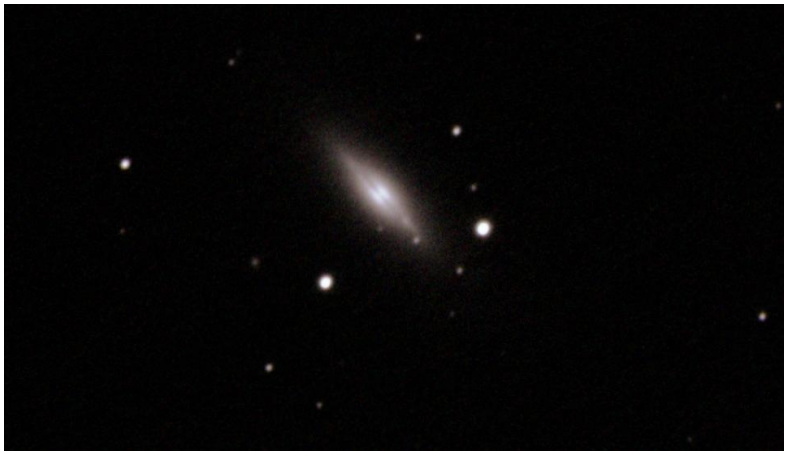
Astronomy magazine contributing editor Stephen James O'Meara makes a good case that M-102 is simply a more refined observation of M-101. He therefore calls M-102 the Fool's Gold Galaxy because, if one thinks they've found it when they're observing NGC-5866, the joke's on them.

NGC-5866 is a bright lenticular galaxy in the constellation of Draco, the largest member of a small galaxy group. A rough distance estimate is 35 million light years, with a diameter of about 50,000 light years.

Lenticular galaxies are disk-shaped like spiral galaxies, but mostly consist of old or middle-aged stars, like elliptical galaxies. Some have prominent dust lanes. NGC-5866's dust lane is "buried" inside of a large outer envelope that makes the galaxy look something like an elliptical on long photographic exposures. Strangely, the dust lane is tilted slightly from the plane of the rest of the galaxy. Also, there is some new star formation in this galaxy near the outer edge of the disk.

About the photo:

The photo of NGC-5866 is composed of 48 sub-frames of five minutes each. Twelve frames each through red, green, blue, and luminance filters, for a total of four hours total exposure. All frames were calibrated with darks, flats and bias frames. The frames were stacked with Deep Sky Stacker, aligned with Nebulosity 2 and processed in Photoshop. The images were taken through an 8-inch Ritchey–Chrétien on an Atlas EQ-G mount. The camera used was a QSI 583 WSG.



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.

Using a 5-inch f/5.7 reflector at 60X, it presented a Saturn-like shape with two stars nearby. Photos showed a third star that looked just a bit dimmer than the second star, with the two dimmer stars being on opposite sides of the galaxy. I saw the small size of the galaxy better with 60X than with 30X. September 17, 1982.

On a mag. 5.5 night, the galaxy was very dim in a 12 X 50 finder, and I saw it better in my 2.4-inch refractor at 21X, which also showed nearby NGC-5907. May 20, 1992.

M-102 second card:

I haven't seen it in about 19 years, but found it (with some difficulty) on June 29, 2011 using an 8-inch f/6 at 60X, then 133X. It was about a mag. 5.5 night for unaided eyes. Stars had some halo. I was surprised that I apparently saw it in a 12.5 X 50 mm finder 19 years ago and NGC-5907 which seemed very dim to me. M-102 was in a fair-sized triangle that fit the field even at 133X. The previously-seen two stars were easy, but the third I may have glimpsed at 133X with averted vision.

Dr. James Dire: Observer from Hawaii

M-102 in Draco is a mag. 10 edge-on galaxy that is classified as a lenticular galaxy (cross between a spiral galaxy and elliptical galaxy). It has a prominent dust lane typical of spiral galaxies, but it has an ellipsoidal shape (like a football), characteristic of elliptical galaxies. Because it is edge-on, spiral arms cannot be seen, if they exist.

Historically, there has been ambiguity as to which galaxy was originally classified as M-102, but today that assignment is given to NGC-5866. Some early 18th and 19th century astronomers claimed M-102 was a duplication of M-101. Truly it may never be known. Regardless, NGC-5866 is a good addition to Messier's original list.

M-102 is roughly 6.3 ´ 2.8 arc minutes in size, which makes it easy to spy at mag. 9.9 in small telescopes. I could easily see it in my 70mm (2 ¾-inch) refractor as a faint blur and it was a delight in my 102mm (4-inch) APO. However, a larger telescope is required to see its' dust lane. Based on gravitational interactions with other galaxies in the NGC-5866 group, it is estimated that M-102 has the mass of one trillion suns, much more massive than the Milky Way.

My image of M-102 was taken the night of June 4, 2011 at the KEASA observatory at Barking Sands on the island of Kauai. It was a 60 minute exposure taken with a 70mm (2 ¾-inch) f/6 achromatic refractor using a hydrogen-beta filter (12 nm bandpass). The image was taken with an SBIG ST-2000XCM CCD camera and covers a field of view 1° ´ 1.5°.

The wide field of view duplicated what might be seen in a finder scope or binoculars, or at low power in a rich-field Newtonian telescope. However, the image captures stars down to mag. 16. There are several fainter, smaller galaxies in the image down to mag. 15.