MONTHLY OBSERVER'S CHALLENGE

Compiled by:

Roger Ivester, North Carolina

&

Sue French, New York

June 2022

Report #161

NGC 5474, The Pie-Slice Galaxy in Ursa Major

Sharing Observations and Bringing Amateur Astronomers Together

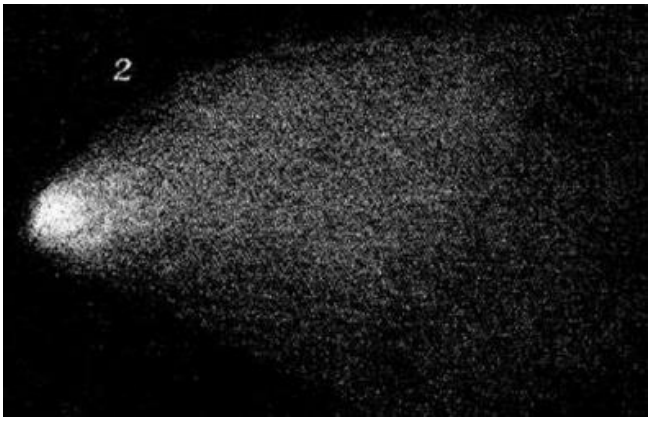
Introduction

The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It's open to everyone who's interested, and if you're able to contribute notes and/or drawings, we'll be happy to include them in our monthly summary. 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 astronomers 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 Observer's Challenge. And for folks with an interest in astrophotography, your digital 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.

This month's target:

William Herschel discovered NGC 5474 on May 1, 1788 with his 18.7-inch speculum-metal reflector. His written journal simply reads: *Considerably bright. Terminating abruptly to the north, and diffused to the south. Considerably small*.

Herschel's sketch:



NGC 5474 has a V (V_T) magnitude of 10.79 +/-0.61.

Credit: ESA/Hubble & NASA

Bertrand Laville: Observer from France

Duration of observation: 69 mins
Date of sketch: Jan 15, 2013 01:51 UT
Viewing location: Observatory of the Baronnies Provençales
Instrument : TN 635 Dobsonian Obsession
Main eyepiece: Tele Vue Ethos 8mm
Magnification: 390×

101× Nagler 31mm
NGC 5474 = Arp 26. The galaxy is easy to find, 40′ from M 101. The vision of the remote CS, due to the interaction of M 101, on an almost round halo, is immediate.

148× Ethos 21mm
Despite careful observation, I did not see any structure in the halo, at least at this magnification.

390× Ethos 8mm
The dark band appears without knowing it or looking for it. The spire S is difficult, and very fuzzy; I did not see the "exit" of the turn in the N part of the halo. No HII region perceived either. Several 14th- to 17th-magnitude stars around the galaxy, only one on the halo.

519× Ethos 6mm
All stars are confirmed; none additional.

In the end, even though NGC 5474 is a distorted galaxy, I saw little structure.

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You can see more detailed descriptions and more of Bertrand's sketches at: http://www.deepsky-drawings.com/

Uwe Glahn: Observer from Germany

Object: NGC 5474

Telescope: 27″ f/4.2 Newton

Magnification: 293× - 419×

NELM: fst 6m5+

Seeing: III

Location: Sudelfeld

Sketch follows.

You can see more of Uwe's sketches at: http://www.deepsky-visuell.de/

Rony De Laet: Observer from Belgium

NGC 5474, a peculiar dwarf spiral galaxy in Ursa Major

NGC 5474 is an elusive object. At first only the core is visible, a dim smudge of light near a small mag 14.5 star. The core is brighter in the centre without a stellar nucleus. The core seems elongated in a SW to NE direction. An extended examination of the galaxy reveals traces of its halo, which is offset to the SW of the core. Brightenings in the halo appear to connect to the elongated edges of the core, making the whole look like a deformed torus.

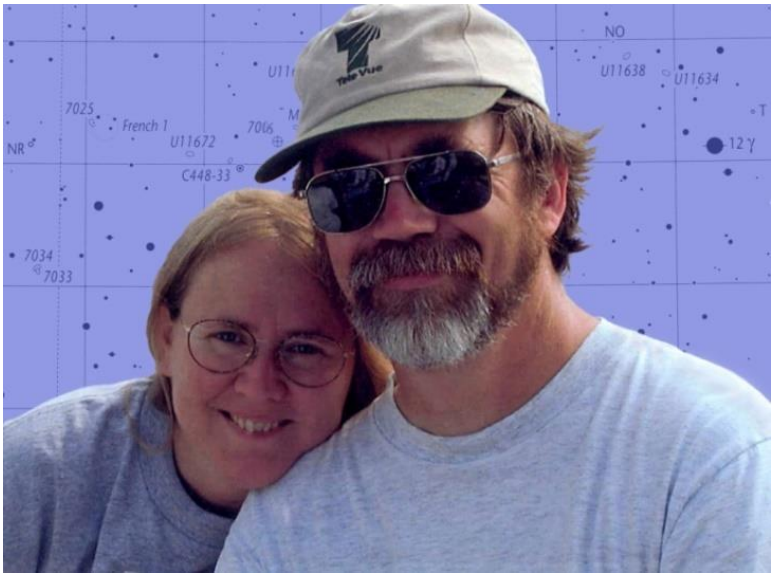
Site : Bekkevoort, Belgium (51° N)

Date : May 28, 2022
Time : around 23:30 UT

Telescope : Taurus 16″
EP: Morpheus 9mm 76°, 200×
Filter : none
Seeing : 4/5
Sky brightness : 20.1 magnitudes per square arc second near zenith (SQM reading).
Sketch Orientation: N up, W right.
Digital sketch made with Corel Paint Shop Pro X2, based on a raw pencil sketch.

Sketch follows.

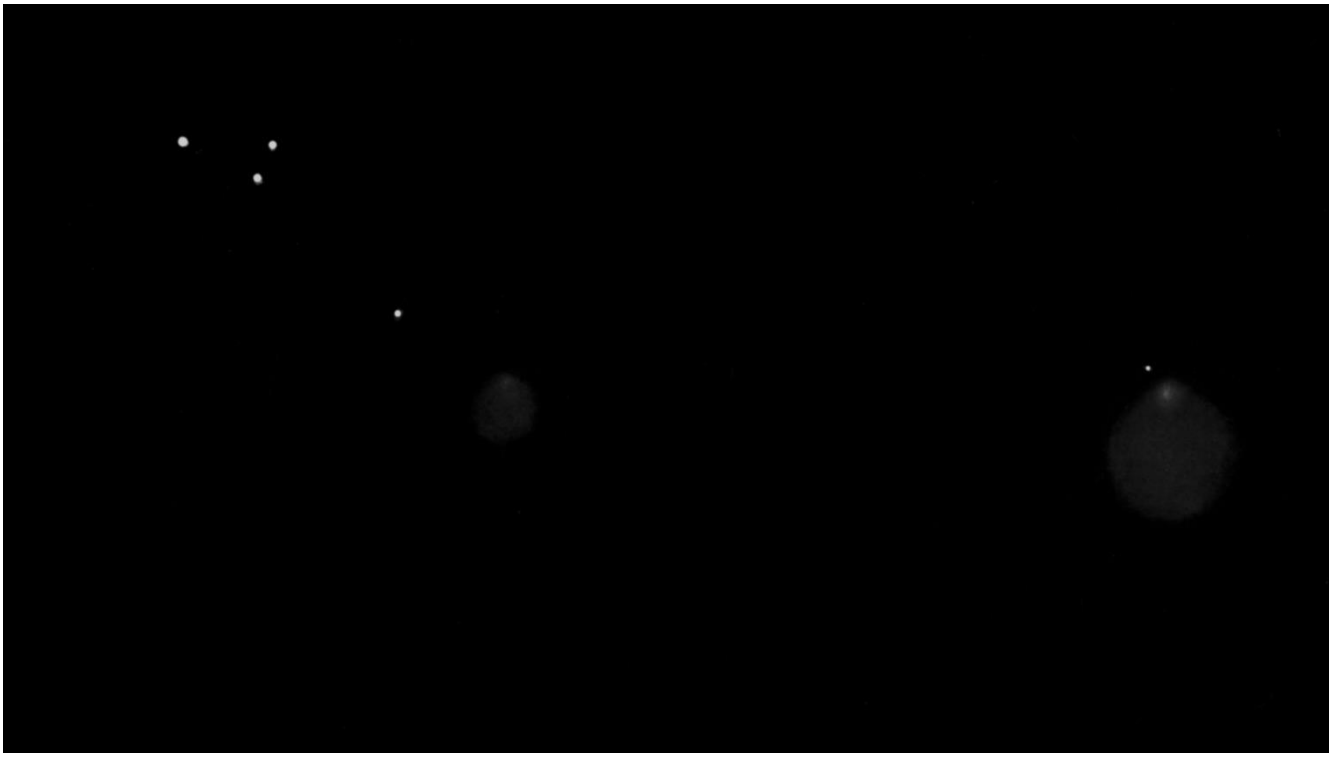
Sue French: Observer from New York



The captivating galaxy NGC 5474 dwells 44′ south-southeast of M101 at the eastern corner of the 10′ trapezoid that it forms with three 11th-magnitude stars. My 105mm refractor at 47× captures a soft round glow, while at 122× the galaxy appears 2′ across and hints at being brightest in the north. The view gets really interesting through my 10-inch scope. At 213× NGC 5457 delightfully reminds me of a quahog clam shell. Its peculiar façade is adorned with a bright hub in the north and then fans out toward the south. A faint star rests less than 1′ northeast of the bright area.

Left: 105mm, 122×
North up and East to the right.

Right: 10-inch, 213×
North up and West to the right



Glenn Chaple: Observer from Massachusetts

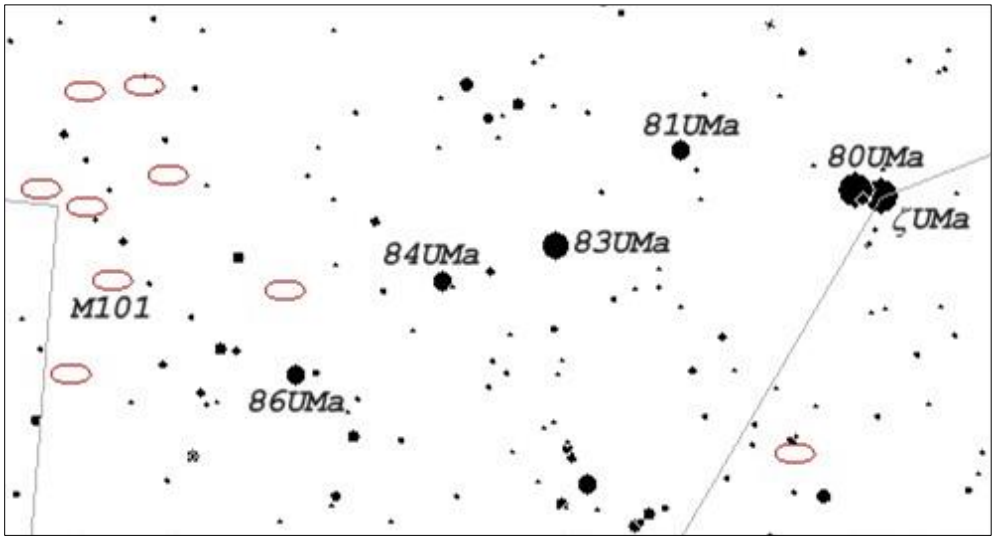
NGC 5474 Galaxy in Ursa Major (Magnitude 10.8; Size 4.7′)

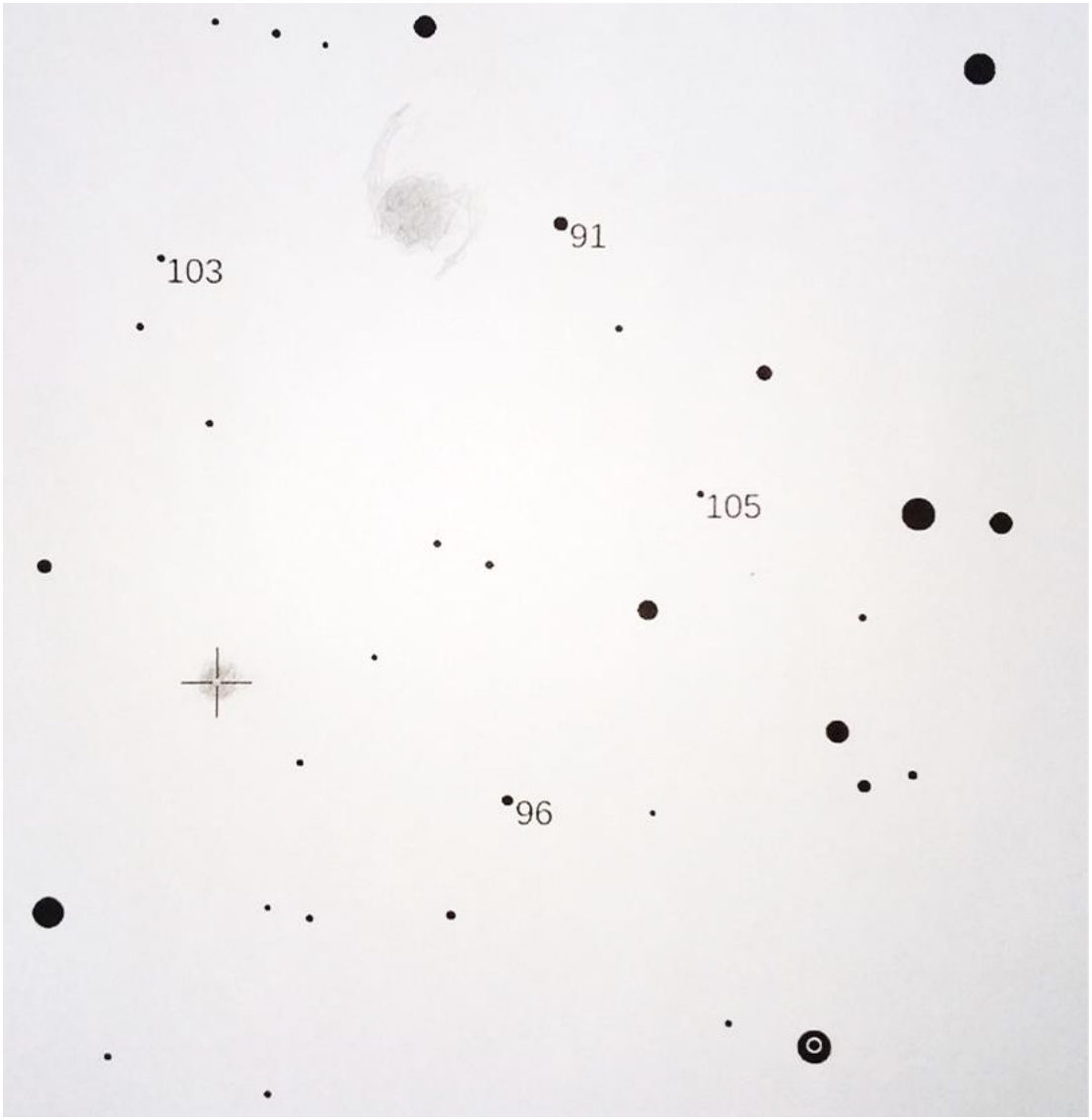
This month's Observer's Challenge is the peculiar dwarf galaxy NGC 5474 in Ursa Major. William Herschel, who discovered it on May 1, 1788, entered it in his deep-sky catalog with the designation H 1-214, which translates to Herschel, Class I [Bright Nebulae], 214th entry). Anyone who has tried to observe this galaxy visually might argue that it belongs in Herschel's Class II (Faint Nebulae).

NGC 5474 can be located by using its coordinates (RA 14^{h} 05^{m} 01.6^{s}, Dec +53° 39′ 44″), but I highly encourage visual observers to star-hop there instead. That's because the starting point is the beautiful double Mizar – the middle star in the handle of the Big Dipper. From Mizar, a series of stellar stepping stones that includes its naked eye partner Alcor (80 UMa), then 81, 83, 84, and 86 UMa will take you to M101, the Pinwheel Galaxy (refer to Finder Chart A). If you're unable to see this 8th-magnitude face-on spiral don't bother with NGC 5474, which is also a face-on spiral but 3 magnitudes fainter.

If you can see M101, spend a few minutes trying to tease out as much detail as you can. The exercise will ready your eye for NGC 5474, which lies less than a degree south-southeast (Finder Chart B). My first attempt to capture NGC 5474 with my 10-inch f/5 reflector was "iffy." The limiting naked eye magnitude was around 5 – typical for my suburban skies. But there was a slight hint of humidity in the air, and all I could make out were fleeting glimpses of a small, ghostly circular glow. A few nights later, a mass of clear, dry air settled over the area, and I tried again. This time NGC 5474 was definitely visible – still a small and faint roundish blob, but steadily seen with averted vision. There was no sight of its oddly-placed nucleus. A big help in capturing NGC 5474 was knowing the galaxy's exact location and approximate size. My best view was with a 79× wide-field eyepiece that captured M101 in the same field of view.

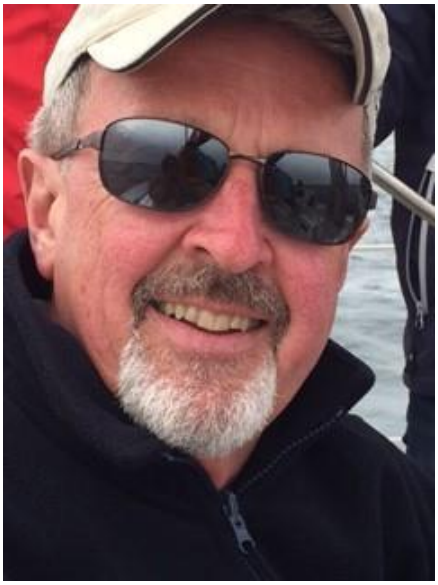
The nearness of NGC 5474 to M101 isn't coincidental. The little galaxy is a companion of the Pinwheel – both being about 21 million light-years away. The odd skewing of its nucleus towards M101 was once thought to be a result of a gravitational tug from the much-larger galaxy but is now thought to be internally produced.





M101 (near top) and NGC 5474 (lower left, marked with cross) Chart prepared using AAVSO's Variable Star Plotter (VSP). Numbers indicate stellar magnitudes (decimals omitted). North is up in this 1½ by 1½ degree field. Chart limiting magnitude is 11.0. Galaxies drawn to scale.

John Bishop: Observer from Massachusetts



This month's Challenge object is NGC 5474, a peculiar dwarf galaxy in Ursa Major. It is relatively near M101, and is thought to be distorted by gravitational interaction between the two galaxies. Images of NGC 5474 would seem to support that view. They show an unusual, face-on galaxy with some spiral structure, and a nucleus offset from the center of the disc

This object was new to me. I observed it twice for this report, first on May 21, and again on May 29, 2022, both times from the ATMoB Clubhouse in Westford, Massachusetts. Observing was done with an 8.25-inch f/11.5 Dall-Kirkham reflector at magnification of 48× to 192×, on a motor driven equatorial mount without go-to. Skies were clear on both nights. Contrast was fair to start, then deteriorated, especially on May 21.

The entry for NGC 5474 in Luginbuhl and Skiff is one of the most meagre, uninviting descriptions in their entire Catalogue. Citing only 10-inch and 12-inch telescope views, L&S describe NGC 5474 as "…diffuse, poorly concentrated… without any distinct detail." Surely this neglected stepchild deserved some attention.

First, we would have to find it. Starting at Mizar/Alcor, a string of four 5th and 6th magnitude stars lead to two faint pointer stars, directed just south of M101, which was a faint glow in the finder. NGC 5474 lay less than a degree south of M101, just west of a line between M101 and an 8th-magnitude star.

Seeing NGC 5474 required averted vision, and time spent on the FOV. A slight brightening in the FOV built up to a faint glow, and then become a definite object, although still quite faint. Unfortunately, Luginbuhl and Skiff were correct. At least for this smaller aperture visual observer, NGC 5474 was a dim, nebulous patch, with no obvious detail or structure. My notes say, "faint, shapeless blob, no core or nucleus, more round than long, smaller than M101, but not small". It was especially helpful to have a polar aligned tracking mount when sharing the view with other observers. I was able to hand off the eyepiece to others, confident that the object was centered, although it was not immediately visible to any observer.

Joseph Rothchild: Observer from Massachusetts

I observed galaxy NGC 5474 twice from dark skies on Cape Cod. The first time was more a detection than an observation.

I observed with my 10″ reflector. I first located galaxy M101. There was a group of 3 stars (almost in a line) in the field that roughly pointed to NGC 5474. There was then another group of 3 stars forming a right angle. The galaxy was close to forming a square with these 3 stars.

NGC 5474 appeared as a faint oval. I observed at 102×. It was best seen by moving the scope slightly side to side. Averted vision did not seem to help. I could not detect a core or other structure.

Mike McCabe: Observer from Massachusetts

Well, I'm happy to report that after three tries – one with the 6-inch refractor and two with my 10-inch Newtonian. I can now say that I definitively saw NGC 5474! This was a tough little guy, and although I initially focused on high power examinations of the field and actually was successful in seeing the galaxy.

However, it worked best when using medium power as I had more background sky to work with. The galaxy was invisible at low powers due to the brighter field. But, it's fitting that this little satellite neighbor of M101, should behave much the same as its bigger brethren due to the low surface brightness, which makes it a real challenge.

This month's challenge brought me back to September of 2018, when at that time the challenge object was the planetary nebula NGC 6818, which is very closely situated near NGC 6822, aka Barnard's Galaxy.

In the same vein as Barnard's Galaxy, NGC 5474 was seen but no significant detail could be discerned. Rather what was seen was nothing more than a very faint and fuzzy patch with no definable shape or structure. A dark sky would probably change this, but most of the time we work with what we have.

My sketch and summary as following from my photo file: Next page.

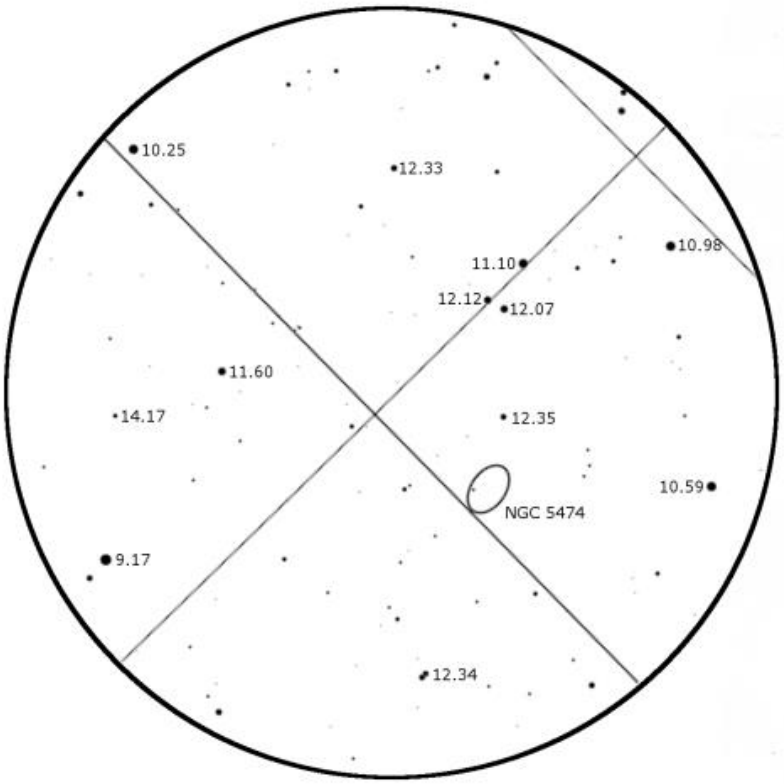
NGC 5474 - Peculiar Dwarf Galaxy in Ursa Major

Date: June 25, 2022
Time: 23:00 EDT
Observing Location: 42*n, 71*w
Telescope: 10" F/5 Newtonian
Eyepiece: 15mm/72* APOV
Magnification: 83x/.87* TFOV
Seeing: 3/5
Transparency: 2.5/5

Comments: NGC 5474 is a satellite galaxy of M101, and in fact both can be seen in the same low-power field of view under good observing conditions. Like M101, NGC 5474 possesses a low surface brightness, which makes it a challenging visual target from all but the darkest skies. It took this observer three seperate attempts from a Bortle 6 sky to secure a defintive observation of the target, and even at that it was part-time direct, part-time averted vision that was used to confirm it. This is certainly a target that would be worth returning to under a dark sky.

Keep Looking Up! ***Mike McCabe***

Starfield Confirmation Chart, Cartes du Ciel



I often find it useful to consult a planetarium program after an observation to confirm the accuracy of my rendering and make sure that I actually saw the correct target. I also often find that the projection used in the rendering of the charts produces a slightly different perspective from that which I saw in the eyepiece. Of course field curvature and the fact that I'm usually working with a hand-driven Dobsonian mount means that my my star placement is in all likelyhood not all that accurate. There's a reason that astrophotography dominates the field of astronomical science; the camera does not lie, does not get lazy, doesn't have to slap bugs away, and doesn't get swayed by any number of distractions during the observing session.

With all that said, sketching is still one of the most enjoyable things an observer can do at the eyepiece.

I highly recommend it! ***Mike McCabe***

Larry McHenry: Observer from Pittsburgh, Pennsylvania

Galaxy **NGC 5474** in Ursa Major:

The dwarf galaxy NGC 5474 is located in the circumpolar constellation of Ursa Major, known as "The Great Bear" and most commonly called the Big Dipper. It was discovered by William Herschel on the night of May 1st 1788 using his 20-Foot reflector (18.7-inch speculum metal mirror) at Slough. Herschel described the galaxy as "considerably bright, and large".

The 11th magnitude galaxy is about 21 million light years distant, and spans a size of 4.8 x 4.3 arc seconds. While not listed in Arp's Peculiar Galaxy catalog, this galaxy does exhibit a distorted appearance, due to its interaction with the much larger, and nearby galaxy M101.

Video-Capture/EAA:

Using EAA techniques, NGC 5474 displays nicely in medium-size optics. It is a fairly bright face-on spiral, with an elongated core, and several spiral arms arranged in parabolic arcs on the south side of the nucleus, with each arm containing knots of HII star-forming regions.

05/30/2022: from Cherry Springs State Park, PA, using an 8-inch SCT optical tube @ f/6.3 on a GEM mount, with a CMOS color camera and broadband filter @ 180-second guided exposure, live-stacked for 30 minutes.

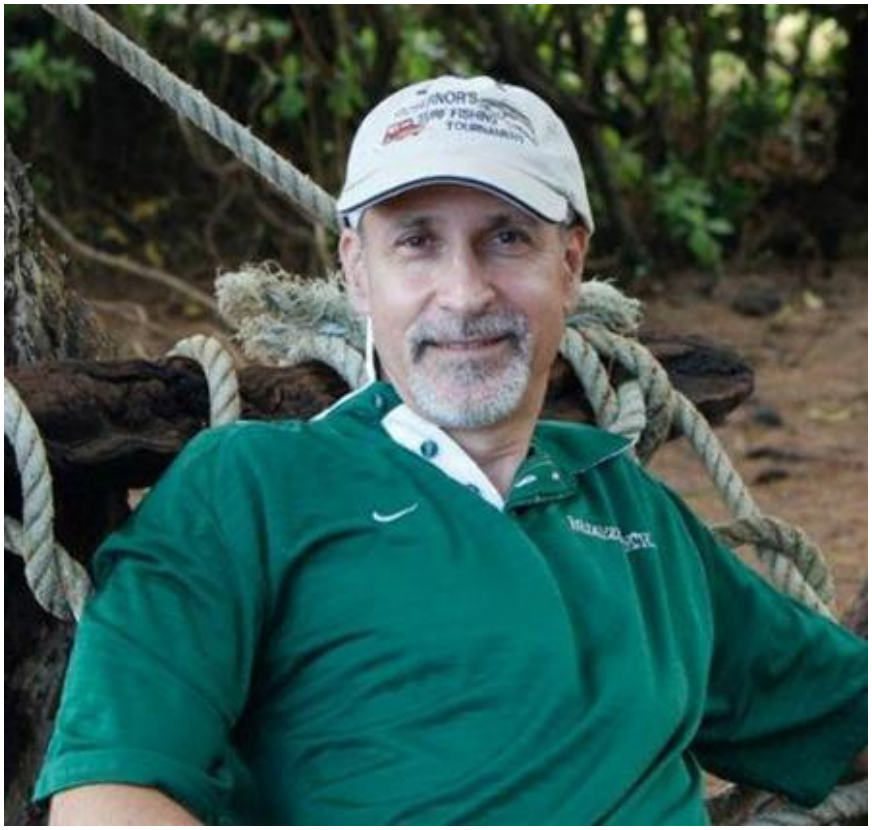
Image follows.

Mario Motta: Observer from Massachusetts

NGC 5474, a distorted galaxy near M101. The following image is 90 minutes of imaging Lum filter only.

Taken with my 32-inch f/6.5 telescope, with ZWO ASI6200 camera, stacked and processed with PixInsight. This is a “dwarf spiral satellite galaxy” of M101, distorted with an off-set center, and spiral arms.

James Dire: Observer from Illinois



NGC 5474 is a peculiar dwarf galaxy in Ursa Major. The galaxy is 21 million light-years away and shines at magnitude 11.3. The galaxy measures 4.8 × 4.3 arcminutes in size. William Herschel discovered NGC 5474 in 1788 using his 18.7-inch Newtonian telescope.

NGC 5474 is a satellite galaxy of M101. Although it is classified as a dwarf galaxy, NGC5474 still contains a few billion stars. It's roughly comparable in size to the Small Magellanic Cloud, a satellite galaxy of the Milky Way.

NGC 5474 is peculiar in that it only has visible spiral structure on one side of the galactic core. The side facing M101 seems devoid of visible matter. The galaxy has undergone some intense gravitational distortion from interactions with the massive Pinwheel Galaxy.

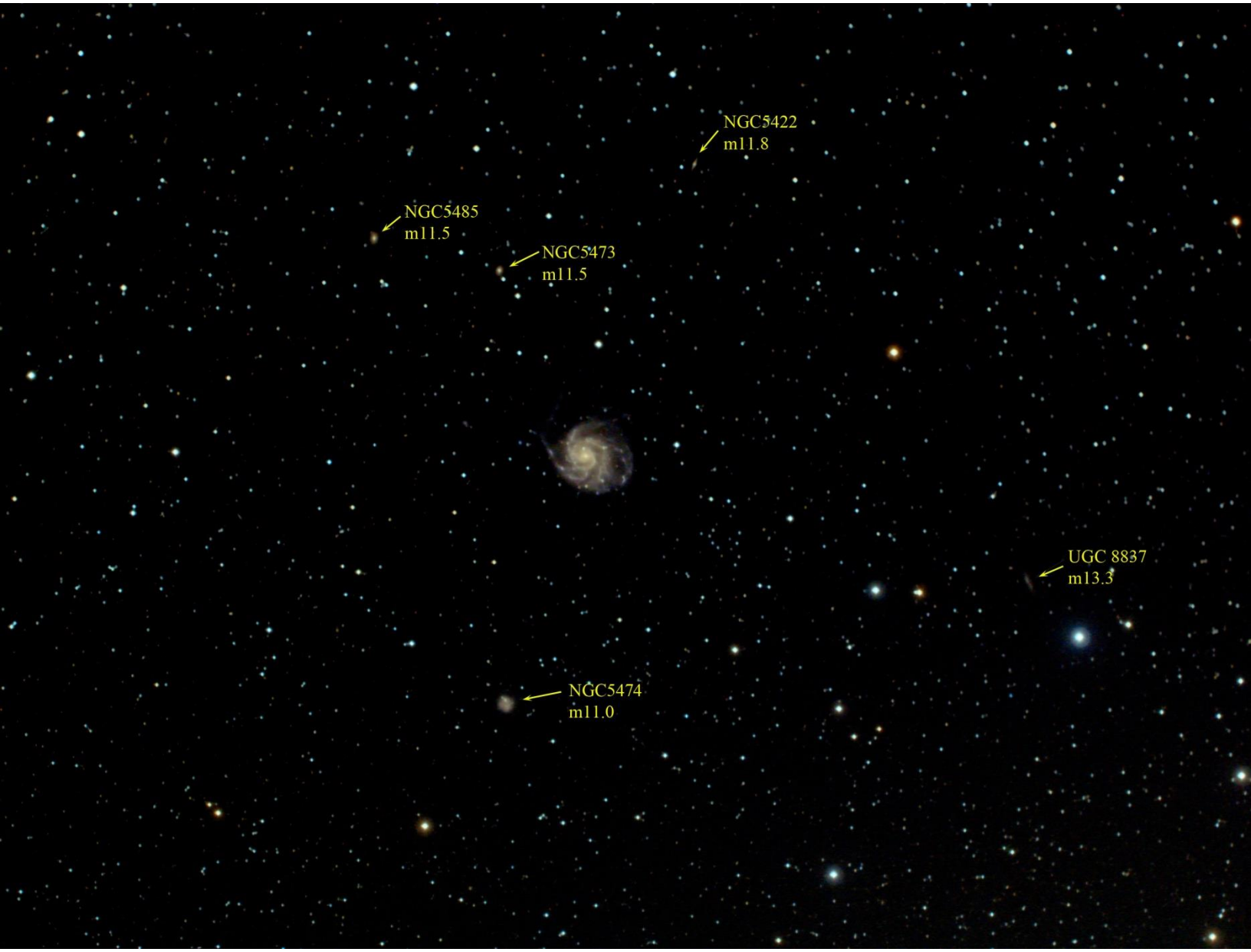
I viewed NGC 5474 with two telescopes this month. The first was an 8-inch, f/3.9 Newtonian with a coma corrector. Using a 26mm Tele Vue Nagler eyepiece (31×), I was able to see both M101 and NGC 5474 at the same time. M101 has very low surface brightness. But in my highly transparent dark skies, I was able to see the pinwheel structure of this galaxy. NGC 5474 has comparable surface brightness to M101. Both are difficult to see under less than ideal conditions. I could make out the core of NGC 5474, as well as a fan structure on one side of the galaxy. The core was very star-like, while the fan-shaped region was just a faint glow.

Next, I observed NGC 5474 with a 10-inch, f/12 Cassegrain reflector using the same eyepiece (117×). The increased magnification spread out the faint light of the galaxy. But the greater surface area of the 10-inch telescope brought more light to the eyepiece. Thus I found the view in the Cassegrain to be very similar to that of the Newtonian. The fuzzy glow of this oddly shaped galaxy was just larger.

I photographed the M101 group, including NGC 5474, using an Askar 72mm f/5.6 Qunituplet apo with a 0.7× focal reducer to yield f/3.9 and a SBIG STF-8300C CCD camera. The exposure was 100 minutes using 10-minute subframes. NGC 5474 appears to be the largest and brightest of the Pinwheel's satellite galaxies. This image shows the level of detail I could see of NGC5474 in my telescopes.

I next imaged NGC 5474 with an 8-inch f/8 Ritchey–Chrétien Cassegrain (with a Tele Vue 0.8× focal reducer/field flattener yielding f/6.4) using an SBIG ST-4000XCM CCD camera. The exposure was 190 minutes again using 10-minute subframes. This image shows a very star-like bright core with spiral structure on the south side of the core. The brighter blotches in the spiral arms are massive regions of ongoing star formation.

NGC5474 is a challenging object to see visually. But it is impressive to see and image this celestial oddball!



David Rust: Observer from Bloomington, Indiana

Phil Orbanes: Observer from Massachusetts

NGC 5474 (and nearby M101).

I decided to do something different. Initially, I took a wide field shot that includes both 5474 and its parent galaxy M101.

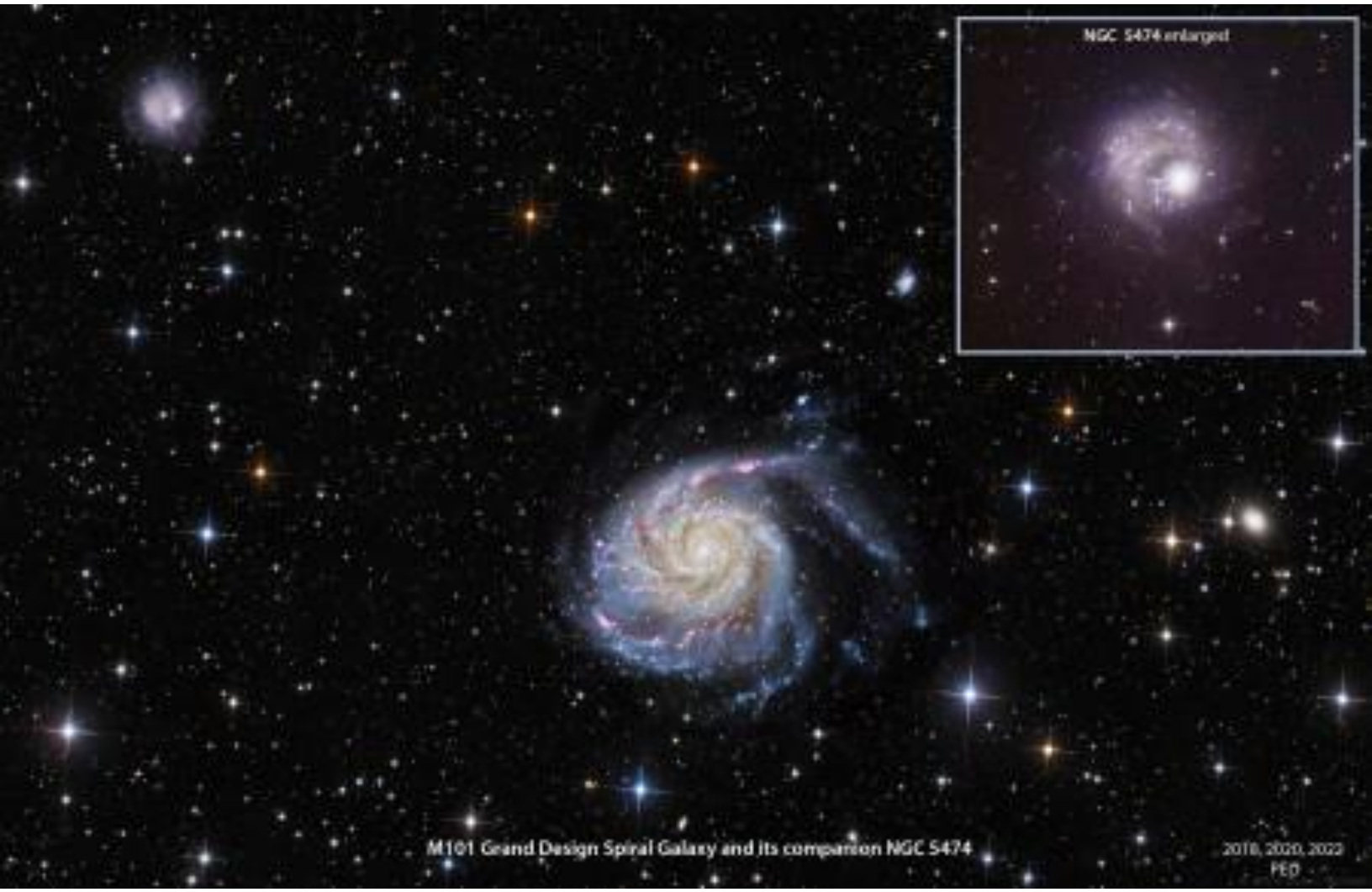
Recently, I took a close-up of NGC 5474. I included them both in the attached image.

NGC 5474 is the most notable of M101's companion galaxies. It lies 21 million light-years away. It is a "peculiar" galaxy because the gravitation interaction between the two galaxies has distorted the disc of 5474, causing its core to be far off-center, and its sitar-forming arms to be thrust to one side..

A total of 22 hours of imaging was made in 2018, 2020 and 2022.

I used my 5-inch Takahashi refractor/FLI camera for the wide field image and my 14-inch PlaneWave reflector/ FLI camera for the close-up.

The total exposure time was divided evenly between R, G and B, Ha filters.



Roger Ivester: Observer from North Carolina

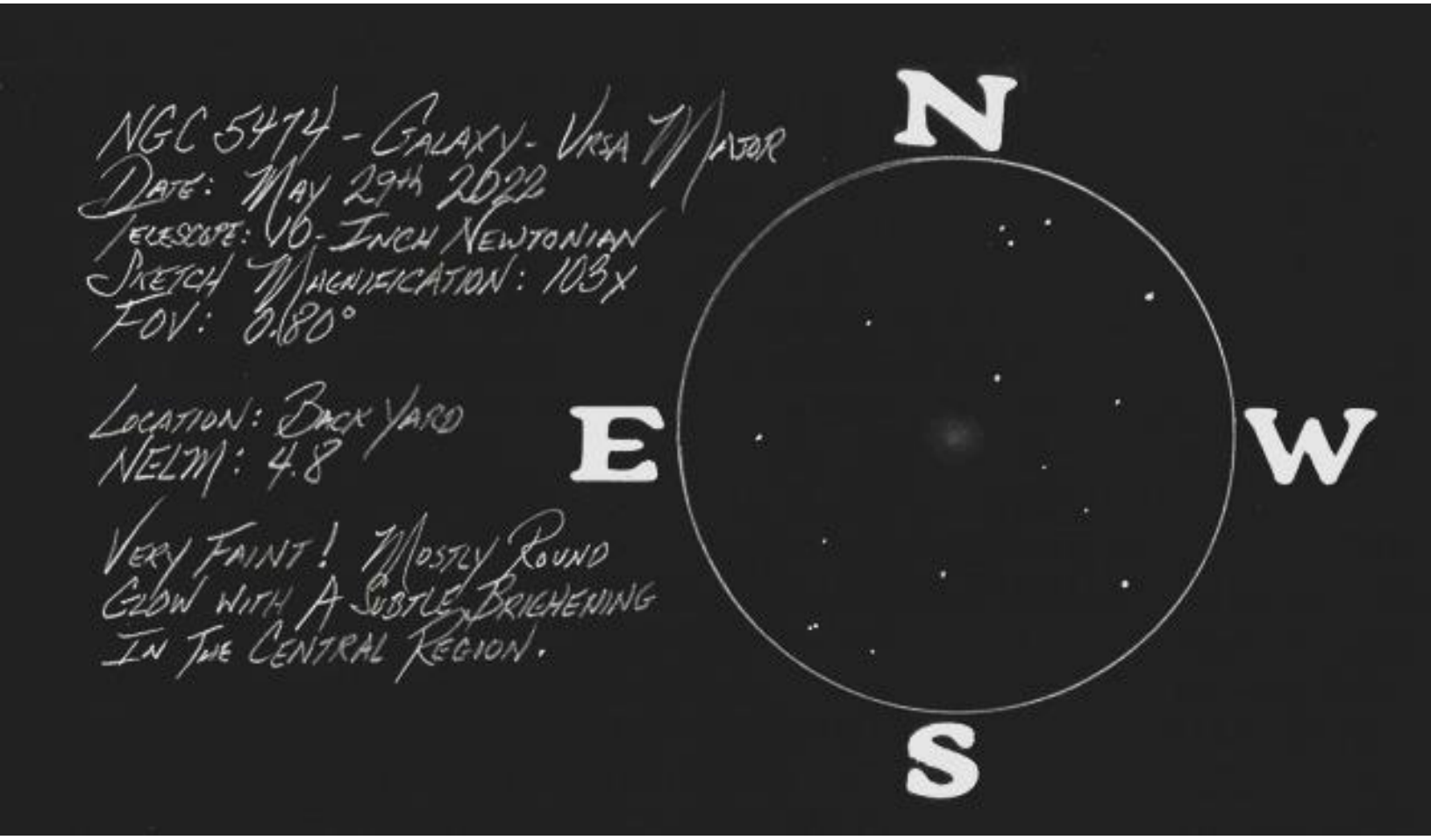
After three previous attempts, I was finally able to see galaxy, NGC 5474. However, not by skill as a visual observer, I was finally successful, but due only to using my GoTo mount.

Visual observers know, when an extremely faint deep-sky object is in the center of the eyepiece field, that faint object almost magically appears.

With my 10-inch f/4.5 equatorially mounted Newtonian at 103×, NGC 5474 appears as a mostly round, very faint glow with a subtle brightening in the center. I could see the galaxy with direct vision, but as all extremely faint objects, averted vision was helpful.

On the night of my one successful observation, I was observing from my back deck under a 4.8 NELM sky. This might prove that amateur astronomy can be productive, fulfilling and enjoyable even under poor suburban skies.

Sketch follows.



The following is the complete listing of all Observer's Challenge reports to-date.

https://rogerivester.com/category/observers-challenge-reports-complete/