

# MONTHLY OBSERVER'S CHALLENGE

## *Las Vegas Astronomical Society*

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*&*

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**NOVEMBER 2017**

**NGC-772 (ARP-78) Unbarred Spiral Galaxy In Aries**

***“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 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.

### **NGC-772 (ARP-78) Unbarred Spiral Galaxy In Aries**

NGC-772 is an unbarred spiral galaxy that lies in the constellation of Aries. It's also known as ARP-78 and is a Herschel object, H-112-1. It was discovered by William Herschel on November 29, 1785. It lies about 130 million light-years away and shines at mag. 11.1, or thereabouts, depending on the source.

It's twice the size of the Milky Way Galaxy at about 200,000 light-years across, and contains very unusual properties, which is why Halton Arp included it in his catalog of peculiar galaxies. It's also the home of two known supernovae.

There are several satellite (or maybe) companion galaxies, including NGC-770, a couple of PGC galaxies and at least one anonymous galaxy. For visual observers, modest to larger apertures are required to spot them, especially the PGCs. The spiral, extended arm of NGC-772 is also quite difficult and takes pristine skies to eke it out of the haze.

## Observations/Drawings/Photos

(Contributors are listed in alphabetical order.)

**John Bishop:** LVAS Friend from Massachusetts

On November 17, 2017 and November 24, 2017, I observed NGC-772 from Westford, Massachusetts. I used an 8.25-inch reflector at 48X, 100X, 133X, and 192X. On both nights, the sky was clear and the seeing was steady, but intermittently there was moisture in the atmosphere.

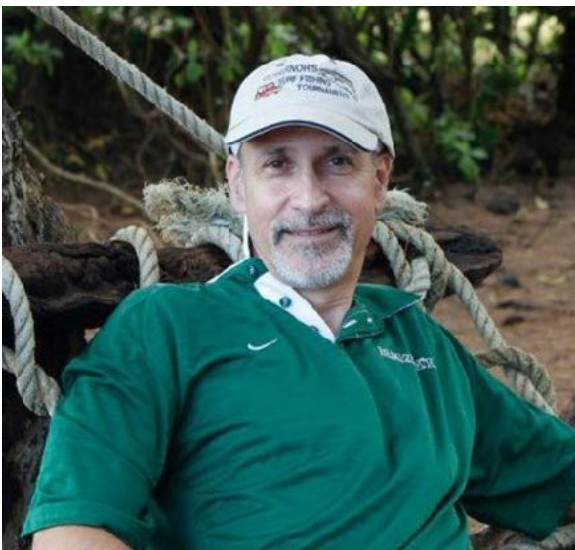
It was challenging to locate, initially. Overall it was a faint, nearly featureless object for this observer. At 48X, the galaxy was a small, faint, hazy patch. At higher powers, I saw a brighter core. At 133X and 192X, a faint, hazy outline of the wider galaxy came in and out of view repeatedly, which gave a “shimmering” effect to the image. I assumed atmospheric conditions, and the object being near the limits of observability for an 8.25-inch scope, caused this. However, I never saw much detail beyond the core.

This was a challenging object for light-polluted, moisture-laden eastern skies. Interestingly, on November 24, 2017, I easily located NGC-891 (normally a challenging object for me at this site), and it was relatively bright. It was located high in the sky, however.



**Gary Bruno:** LVAS Member from Las Vegas, Nevada

I used a 14-inch Schmidt-Cassegrain telescope to observe galaxy NGC-772 in Aries. It was faint, but I was able to detect its spiral arm on the NW edge (barely). An easy find, located about 3° east of bright star, Mesarthim.



**Dr. James Dire:** LVAS Friend From Hawaii

NGC-772 is a fine spiral galaxy in the constellation Aries. The galaxy resides 82 arcminutes east-southeast of the great mag 4 binary star Mesarthim, a.k.a. Gamma Arietis. The galaxy is approximately mag. 10 and is 7 X 4 arcminutes in size.

It's nearly face on, but asymmetrical in shape. The distorted appearance is due to gravitational interactions with NGC-770, a nearby mag. 14 elliptical galaxy. Distance measurements for the pair range from 87 to 130 million light years. The spiral galaxy is thought to be twice the diameter of the Milky Way Galaxy. Some astronomers have classified NGC-772 as a barred spiral, while other claim it has no central bar.

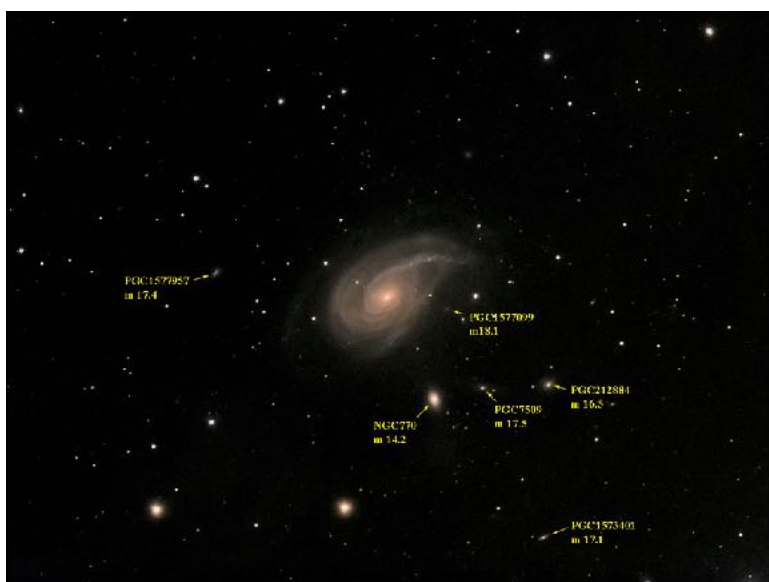
I viewed NGC-772 using a 190mm (7.5-inch) f/5.3 Maksutov Newtonian at 111X. The bright core of the galaxy stood out. With averted vision, I could make out the asymmetrical shape of the spiral arms.



My first image was taken with a 10-inch f/6.9 Newtonian using an SBIG ST-2000XCM CCD camera. The exposure was three hours. The two brightest stars in the image, on the left side near the bottom, are mag. 11. The faintest stars in the image are mag. 19.

The second image has arrows showing several of the fainter galaxies around NGC-772. I have labeled them with their best catalog numbers and mags. The faintest of these galaxies is mag. 18.1. NGC-770 is the dwarf elliptical galaxy just to the south of NGC-770.

NGC-770 is thought to be a satellite galaxy of NGC-772, but it may have recently (cosmologically speaking) been captured and could be on a collision course with the larger galaxy. NGC-772 is unique in that its outer stars rotate around its core in the opposite direction the core rotates. This just adds to the mystery of how these two galaxies came to be associated with each other.



**David Eicher:** Editor – *Astronomy Magazine* and LVAS Friend From Wisconsin

Small telescopes show NGC-772 as a gray, oval haze some 2' or 3' across. A 4-inch scope at high power reveals the galaxy's bright, condensed, ball-like nucleus centered in the nebulous envelope representing the spiral arms. An 8-or 10-inch telescope shows a star just off the galaxy's western side and under good conditions may faintly show the galaxy's spiral arms or at least the brighter north-western arms. Large scopes in the 16-inch and larger class show the galaxy as a large oval smudge of light superimposed over a bright, almost star-like nucleus and a ghostly spiral arm pattern.

If you observe it with a large scope, you may also spot NGC-770 in the same field of view, 5' south of the spiral. NGC-770 is an elliptical galaxy some 1.3' by 1.0' across, with a blue mag. of 14.1. This object appears as a tiny, fuzzy, out-of-focus "star" at low power. At high power during good seeing it shows as a pale patch of nebulosity with a slightly brighter middle.

*The Universe from Your Backyard - A Guide to Deep-Sky Objects* from *Astronomy Magazine* David J. Eicher



**Chris Elledge:** LVAS Friend from Massachusetts

On November 11, 2017, @7:20pm, EDT, I used a 10-inch f/5 reflector to observe NGC-772 from the ATMoB Clubhouse. Sky conditions were: Bortle Scale 6: NELM 4.5: Transparency fair: Seeing good.

The Clubhouse's eastern sky is the poorest area to observe, but since the sky transparency was expected to get worse later in the night, I decided to go ahead and attempt my observation of NGC-772 before it reached its highest altitude. The sky around Aries at the time was probably closer to NELM 4.0 since Mesarthim was difficult to see near more clearly visible Hamal and Sheratan.

With a 35mm eyepiece (1.9° FOV), I was able to fit Sheratan and Mesarthim into the view. I moved the telescope to place Mesarthim on the west side of the view. That should've put NGC-772 in the eastern side of the eyepiece. I saw nothing, despite the star patterns matching my map. I found the two mag. 11 stars TYC 1210-1339-1 and TYC 1210-0488-1, which together with the center of NGC-772 should form a triangle with 1339 to the east of 0488, and NGC-772 to the north of 0488.

I centered TYC 1210-0488-1 in the eyepiece and swapped to a 10mm eyepiece (127X, 0.6° FOV) to attempt a higher magnification. After staring at the view for many minutes, I never saw more than what I thought was a slightly lighter spot in the sky where the galaxy should be. I revisited this again 2 hours later, with it much higher in the sky, where the light pollution would be lower. As predicted, high cloud cover had moved in and the loss in transparency made the view pretty much identical to what I saw earlier.

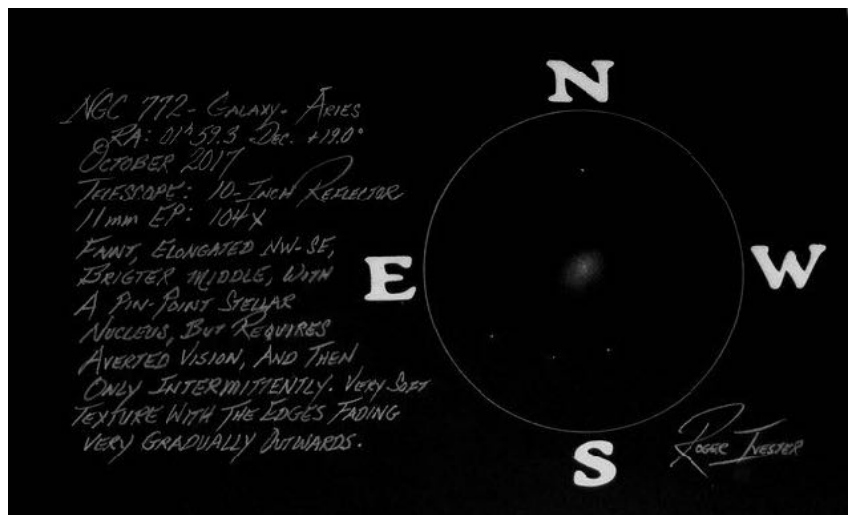


**Roger Ivester:** LVAS Member from North Carolina

From my 5.0 NELM backyard, I used a 10-inch reflector at 104X to observe NGC-772. It was faint and difficult with low surface brightness, elongated, but subtle, and oriented NW-SE. The middle was a bit brighter, with little concentration. I noted a pin-point stellar nucleus, however intermittently, and required averted vision to see it. It had a very soft, mostly even halo with the edges fading gradually outward.

The last time I observed this galaxy was in November, 1993, from the same location and with the same telescope. My notes from that session were almost verbatim to my most recent observation. A true dark site is necessary to see faint details and structure, especially when using a 10-inch telescope.

The pencil sketch was done using a 10-inch reflector with a 5.0 NELM.







**Gus Johnson:** LVAS Friend from Maryland

On October 20, 1979, I used a 12-inch reflector @ 80X to observe NGC-772. It was round, with a brighter center. (This observation was only six months after my SN discovery, 1979C.)

In November, 1986, I used a 6-inch reflector @ 59X. It was dim and round, making a triangle with two dim stars.

**NOTE:** For those new to the Observer's Challenge, a bit of history about Gus Johnson including a link to a YouTube video:

SN 1979C was a supernova about 50 million light-years away in Messier 100, a spiral galaxy in the constellation Coma Berenices. The Type II supernova was discovered April 19, 1979 by Gus Johnson, a school teacher and amateur astronomer.[2] This type of supernova is known as a core collapse and is the result of the internal collapse and violent explosion of a large star. A star must have at least 9 times the mass of the Sun in order to undergo this type of collapse.[3] The star that resulted in this supernova was estimated to be in the range of 20 solar masses.[1]

On November 15, 2010, NASA announced that evidence of a black hole had been detected as a remnant of the supernova explosion. Scientists led by Dr. Dan Patnaude from the Harvard-Smithsonian Center for Astrophysics in Cambridge, MA evaluated data gathered between 1995 and 2007 from several space based observatories. NASA's Chandra X-ray Observatory, the Swift Gamma-Ray Burst Mission, as well as the European Space Agency's XMM-Newton, and Germany's ROSAT all participated in the examination.[4] Source – Wikipedia <https://www.youtube.com/watch?v=EKnSwPNqypo>



**Mike McCabe:** LVAS Friend from Massachusetts

For the LVAS November Observer's Challenge, I was able to observe the interacting galaxy pair of NGC-772 and NGC-770 several times. I was also able to use several different telescopes, including 8-inch, 12.5-inch and 18-inch reflectors as well as two 9.25-inch SCT's.

My first observation of NGC-772 came on the evening of October 20, 2017, when a few of us got together at a site called Destruction Brook Woods in Dartmouth, MA. The hope was that the site would provide exquisitely dark skies (well, at least relative to what we're used to). Although the site was somewhat dark, the observing on this occasion was hampered by bottom-of-the-barrel seeing and variable transparency.

I had brought my 8-inch Dobsonian-mounted reflector, and the hop from Mesarthim in Aries to NGC-772 was easy enough. Seeing the galaxy was a challenge, though, and I finally found it bracketed between two mag. 9 stars and capped by a trio of stars in the mag. 11 to 12 range. I then asked two of my fellow observers to pull it up in their 9.25-inch SCT's. Since they were using accurate GOTO systems, it was merely the push of a few buttons and we were right on target. The view of the galaxy in the slightly larger compound optics systems was very similar to the view in the 8-inch Newtonian – dim. We didn't spend a lot of time dwelling in the area, but for the time we did, there was no evidence of NGC-770.

I subsequently conducted follow-up observations from my driveway with my 12.5-inch Dobsonian-mounted reflector. On the evening of November 12, 2017, I was blessed with a sky that had better-than-average

transparency, at least according to the CSC rating. Going back to NGC-772, I was pleased as punch to find that I could indeed glimpse the tiny little interacting companion galaxy NGC-770 when I cranked up the magnification a bit. In the 12.5-inch, NGC-772 exhibited a bright core and NGC-770 exhibited what could only be referred to as a “stellar” core – intermittently it appeared as though a dim star existed right in the middle of the very faint fuzz. NGC-770 was only visible in a medium/high magnification range. Less than 100X showed only NGC-772, and over 200X also caused NGC-770 to do a disappearing act.

I took one last stab at the interacting duo on the evening of November 19, 2017 while looking through the eyepiece of a fellow observers’ 18-inch reflector. I was hoping for great things with the significantly larger scope, but the sky just wasn’t going to give it up. We had to settle for a view quite similar to what I’d experienced in the 12.5-inch, with a clear sky –barely viewable little NGC-770 with a stellar core, again.

So that’s my report on observing the interacting galaxies NGC-772 and NGC-770 in the constellation Aries. Fun stuff –I highly recommend them!



**Mario Motta:** LVAS Friend from Massachusetts

Done with a 32-inch reflector.





**Richard Nugent:** LVAS Friend from Massachusetts

I'm not a fan of galaxies. Considering that they pepper the sky, my observing lists are usually devoid of them. I have it figured out...it's because I live in eastern Massachusetts. Our skies are awash with (now LED) light. My reports routinely mention my NELM of only 4.8 — that's a Bortle Scale 7 site. The observing site of the Amateur Telescope Makers of Boston is darker, likely a 5/6 on the Bortle scale. Light pollution filters don't help with galaxies and, despite the manufacturer's claims, the "galaxy enhancing" filter I own does little to improve contrast. So, what's an observer to do? The best option is to get to a dark sky or, if that isn't a practical option, increase the telescope's magnification to darken the background.

I've had only two opportunities to observe these galaxies during late October and November. The first was through Steve Clougherty's 18-inch Dob at the ATMoB observing site. NGC-772 looked like a diffuse, slightly oval patch of light. I could not make out any detail in the galaxy. Nearby NGC-770 was barely visible to me as a very small, featureless glow. Neither were impressive. From my own observing site, I could ever-so-barely see NGC-772 through my 10-inch reflector. NGC-770 was invisible. In the 20-inch, the view was much better. Using a magnification of 194X, both galaxies were pretty easy to see. Still, they looked washed out. By increasing the magnification to 388X, the background darkened and the galaxies stood out nicely. Still, they both looked like featureless glows. Kepler and Sanner gave NGC-772 and NGC-770 three and two stars, respectively. I'd agree. These are not impressive. Had it not been for the LVAS challenge, I probably never would've searched for these objects. I'm glad I did because I think it's fun to observe two or more galaxies in the same field of view. Contrast enhancement through increased magnification can only improve the view by so much. You know what they say...nothing beats a dark sky! It might be time to consider modifications to the 20-inch that would make it more transportable — to dark skies.



**John Lourdes Pierce:** LVAS Member from Las Vegas, Nevada

Being unable to go to a dark location this month, I tried just the same to observe NGC-772 from within the bright skies of Las Vegas. On several nights, and while it was at its highest, I used a 10-inch reflector at several magnifications. I located its position with no problem and even could see a few mag. 11 stars next to the position of this dim galaxy. I tried all the tricks, such as averted vision and using field motion by lightly tapping the telescope tube. These are tricks that have worked for me before. However, not this time. The diffused nature of the object and its mag. of about 11 was no match for the Las Vegas glow.





**Fred Rayworth:** LVAS Member and AL Coordinator from Las Vegas, Nevada

I've only observed NGC-772 three times, and the companion, NGC-770 once.

The first time was on November 16, 1998 using my 16-inch f/6.4 at 82X from my back yard in Tipton, Oklahoma at 1,300 feet. It was cool, clear, and with a slight breeze. The neighbor's light was not blocked by his semi because the vehicle was out on a trip. However, I could still see the Milky Way almost to the horizon.

The galaxy was a small, round halo with a stellar core. I didn't note anything else at the time.

On September 11, 2010, using my commercial 16-inch f/4.5 at 102X, I observed it again from Cathedral Gorge State Park in east-central Nevada at 4,800 feet. It was cool and calm, but warmer than the night before. It seemed super clear, but others were complaining about transparency, especially to the south. At around 23:30, thin clouds started to move in from the south and southwest. The skyglow from nearby Caliente was very evident. By the time I gave up, some areas of the sky seemed brighter than they should be. When I woke up Sunday morning, it was overcast at 07:00 but pretty much cleared off again by 09:00.

NGC-770 was a broad, faint oval with a stellar core. No sign of the arm.

The final observation included NGC-770 and a possible but unconfirmed sighting of one of the nearby PGC galaxies using my 16-inch f/4.5 at 102X, 229X & 390X. This took place on November 18, 2017 from my usual site at Redstone Picnic area on the north shore of Lake Mead at 2,100 feet. It was clear and cold, and getting colder. The sky was pretty transparent, though there was some nebulae around the brighter stars. There was no breeze at first, but later in the evening, a few annoying gusts picked up. It was downright chilly enough that my green laser pointer didn't work. In many ways, the sky was pristine and it was a very productive night.

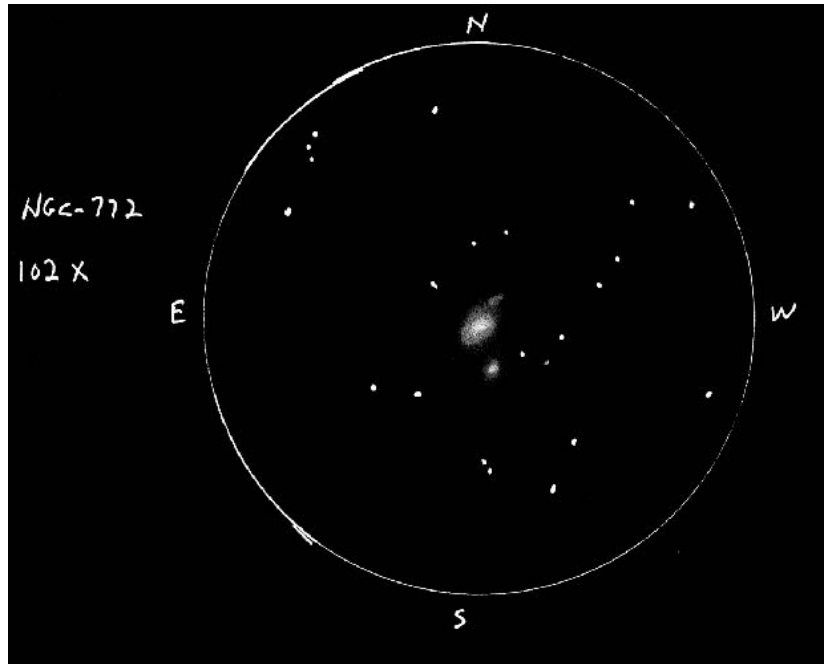
The galaxy was medium-small with a dense core and vague spiral shape. An arm extended to the north and I didn't see it until a little later in the evening. I saw just a hint and confirmed it in my observing partner's 17.5-inch, then came back and verified it in mine. At first, I thought it was one of those satellite PGC galaxies, but they were located southwest near the much brighter satellite galaxy, NGC-770, which was very faint but quite visible. Tried first, 229X and then 390X, but they both just washed it out too much. 102X was the best magnification to see everything, especially the delicate arm which didn't quite connect with the main body. The tip of the arm still looked like a separate galaxy, with just the slightest hint of haze between it and the core, but not organized enough to call it an arm. It definitely looked separate.

The PGCs were not visible at all except what I thought was a slightly out of focus star might have actually been one of the PGCs, but I can't confirm that. For all I know, I might have seen both of the brighter PGCs to the south now that I know exactly where to look. There are two stars down there but they were accounted for when I got home. However I saw more than two bright enough to notice in the eyepiece, so after comparing what I saw with what the chart showed, maybe I *did* see a PGC or two after all. Even in my friend's 17 1/2-inch, they still looked like star-to-fuzzy-stars at best, so not sure. Another crack at it might be the best way to confirm that.

NGC-770 was a very tiny, faint glow next to NGC-772. At first, it was hard to detect and I thought it was also just a star. However, that "star" turned out to be the core of the either elliptical or face-on galaxy. Later in the evening, and also through the 17 1/2-inch, finally saw the fuzz and halo around it to confirm it was actually a galaxy and not a star. I went back to my scope and it pretty much slapped me in the face by that point because it was much higher in the sky. I must note that all those *extra* stars still didn't look like much more than pinpoints so I wasn't sure what they were at the time. Oh well...



The drawing is a composite “best of.” Note the tip of the arm almost touches the glow of the main galaxy. There’s no connecting arm and that’s almost what it looked like, maybe exaggerated in proximity only. I will say the tip was pretty distinctive, once I picked it out.



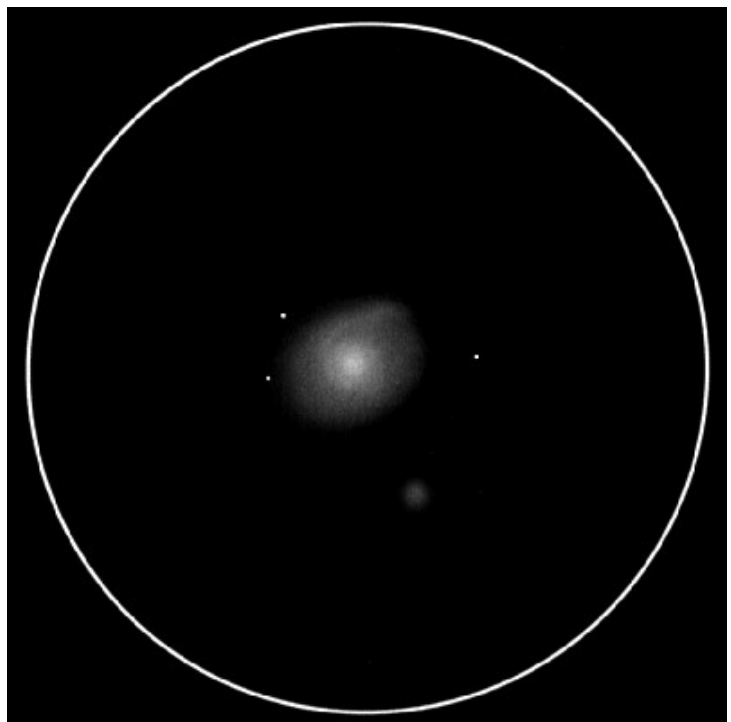
**Joseph Rothchild:** LVAS Friend from Massachusetts

I observed NGC-772 on November 17, 2017 under dark skies on Cape Cod, with 20 MPH winds, using a 10-inch reflector at 81X. The galaxy appeared as a small, diffuse round haze, with a central almost star-like condensation. I wasn’t able to observe any other structure. Fortunately, this was same night as the Leonids. I saw only a small number of meteors, but there were several bright meteors with trails that persisted for 1-2 seconds.



**Jaakko Saloranta:** LVAS Friend from Finland

Using an 8-inch telescope @ 200X, NGC-772 appeared as a bright, slightly elliptical galaxy with some structure visible in the northern side of the halo. The nucleus appeared non-stellar and slightly elongated. A fainter mag. 13 galaxy to the south was NGC-770. Two mag. 14 stars were visible east of the galaxy and a single mag. 13 star was visible west from NGC-772.





**Jay and Liz Thompson:** LVAS members from Henderson, Nevada

We looked at NGC-772 from our backyard in Henderson, NV with a 16-inch SCT. With a 21mm (194X) eyepiece, the core was fairly evident. There was an extended haze around the nucleus. The nucleus was fairly small and had a star-like central part with a brighter coma around it.

Extending out further than the coma was a hazy area that may have had a little texture, but we couldn't define

any arms. In a 15mm (271X) eyepiece, it had a bright core with a surrounding haze. The companion galaxy, NGC-770, formed an equilateral triangle with the core of the galaxy and another star. The best view was in the 15mm eyepiece, and with a 10mm (406X) eyepiece being too much magnification, though we could still see both galaxies.

From darker skies using a 17-inch Newtonian reflector in Lake Mead Recreational Area and from Meadview, AZ, both galaxies were easier to see. The soft glow surrounding the nucleus from the disk and arms of NGC-772 was asymmetrical, but I (Jay) could not discern the arms themselves at 227X.