MONTHLY OBSERVER'S CHALLENGE

Compiled by:

Roger Ivester, North Carolina

&

Sue French, New York

September 2023

Report #176

NGC 6891, Planetary Nebula in Delphinus

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:

Ralph Copeland discovered NGC 6891on September , 1884 while serving as the director of Dun Echt Observatory in Scotland. He used a 6.1-inch refractor with a visual spectroscope.

Copeland wrote: *This seems to be identical with the 9.5 mag. star D.M.+12°,2466. It is in reality a planetary nebula about 4" in diameter with a nearly monochromatic spectrum.*

Copeland is best known to amateur astronomers for his discovery of the group of galaxies in Leo that is now known as Copeland's Septet.

Uwe Glahn: Observer from Germany

First Sketch:

Object: NGC 6891

Telescope: 27" f/4.2 Newton

Magnification: 172×

Filter: OIII

NELM: fst m5+

Seeing: II-III

Location: Edelweißspitze

Second Sketch:

Object: NGC 6891

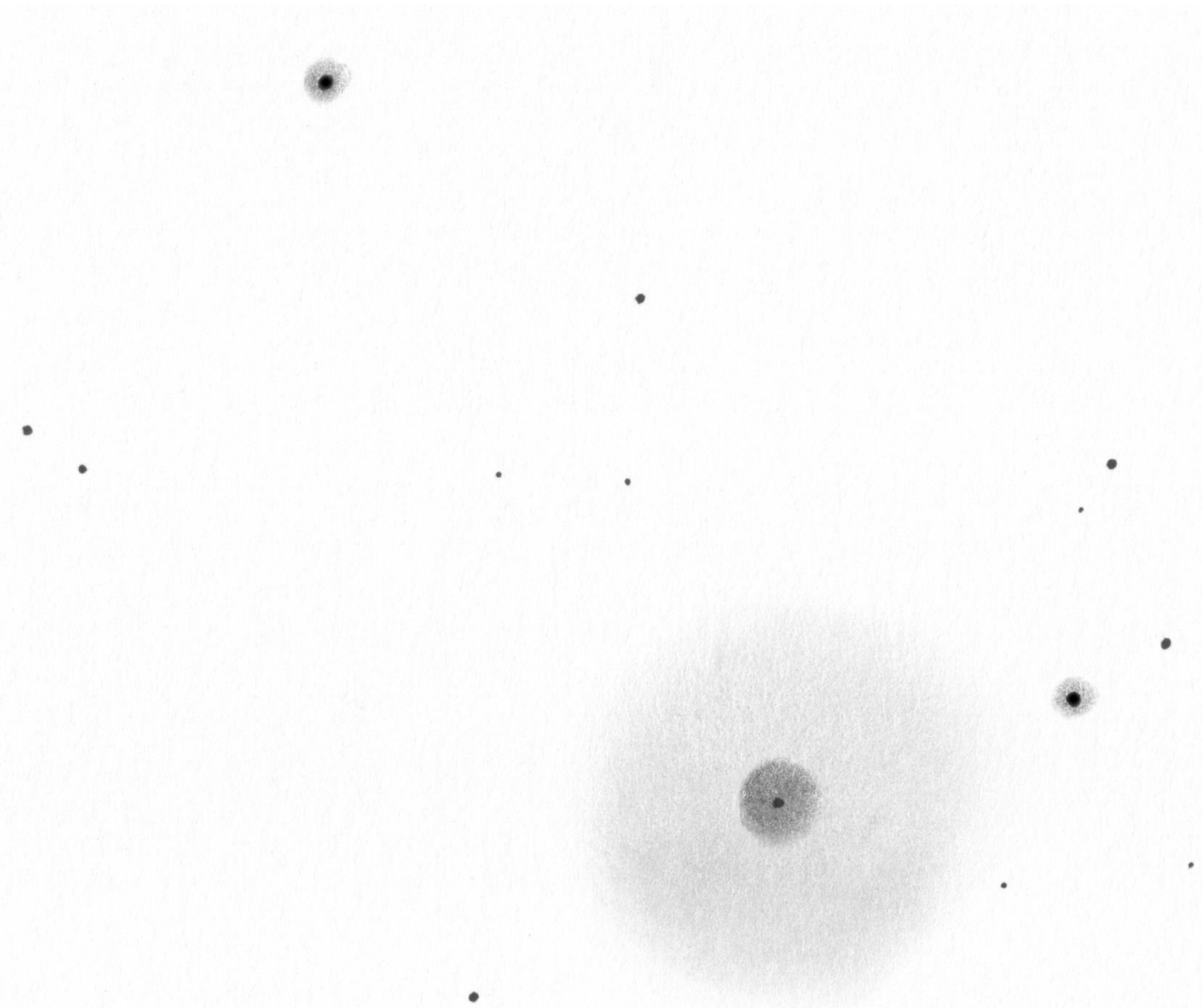
Telescope: 27″ f/4.2 Newton

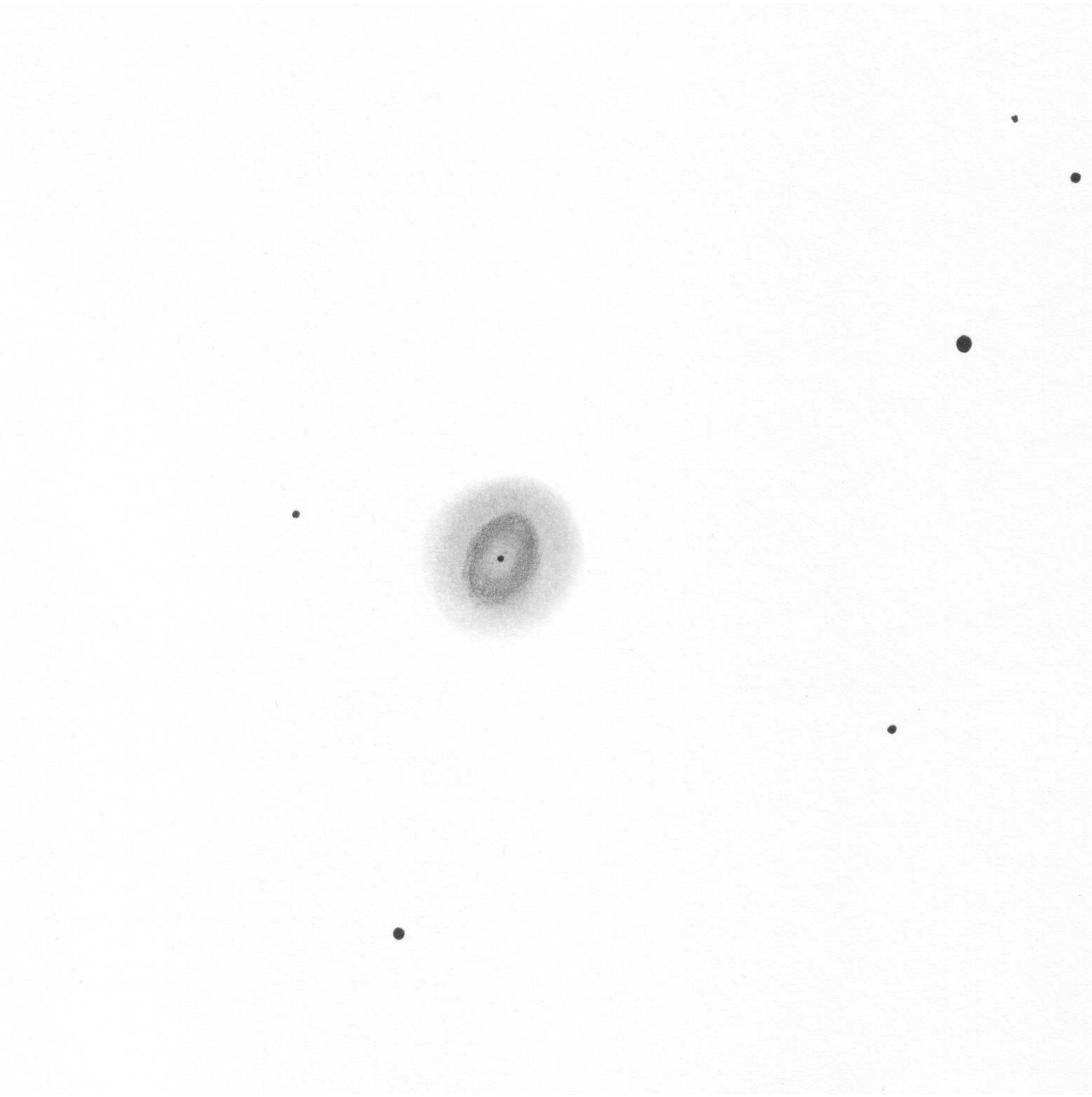
Magnification: 873×

Filter: OIII

NELM: fst 7m0+

Seeing: II





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

Bertrand Laville: Observer from France

Observatoire de Baronnies Provençales, October 18, 2020,195× Nagler 16mm/OIII-5nm
TN 635 Obsession Dobson

The aim of the observation is to try to perceive the broad external halo of the PN, the existence of which I only recently learned. The Astrodon OIII-5nm filter is remarkable for increasing image contrast. The external halo is well seen, almost round, and we can even see that its surface brightness is not uniform.

Two reinforcements in luminosity appear when you know them: one at the SSE, it is the least difficult, the second goes from W to N, over 90°, on the periphery of the disk. It even seemed to me that the halo was a deep blue, but I was probably influenced by the DSS image that I had previously analyzed before the observation.

x520 Ethos 6mm without filter:

I did not analyze the internal halo and the hull, which I know well and which was not the goal. On the other hand, I pointed out the nearby stars, with the sole aim of placing the limits of the external halo. I therefore did not try to perceive all the possible limit stars; However, I see when I clean up my drawing that I have pointed out more stars than in 2011 and 2017. This is proof, if proof were needed, of the improvement in the perception of faint stars when seeing is very good; This evening it was 1.6" at the time of the operation: QED!

PS: the drawing I made of my 2020 observation only differs from that of 2017 by the addition of the external halo. The field, shell, and internal halo are those of 2017.

You'll find further details and more of Bertrand's sketches at: http://www.deepsky-drawings.com/

Larry McHenry: Observer from Pittsburgh, Pennsylvania

http://stellar-journeys.org

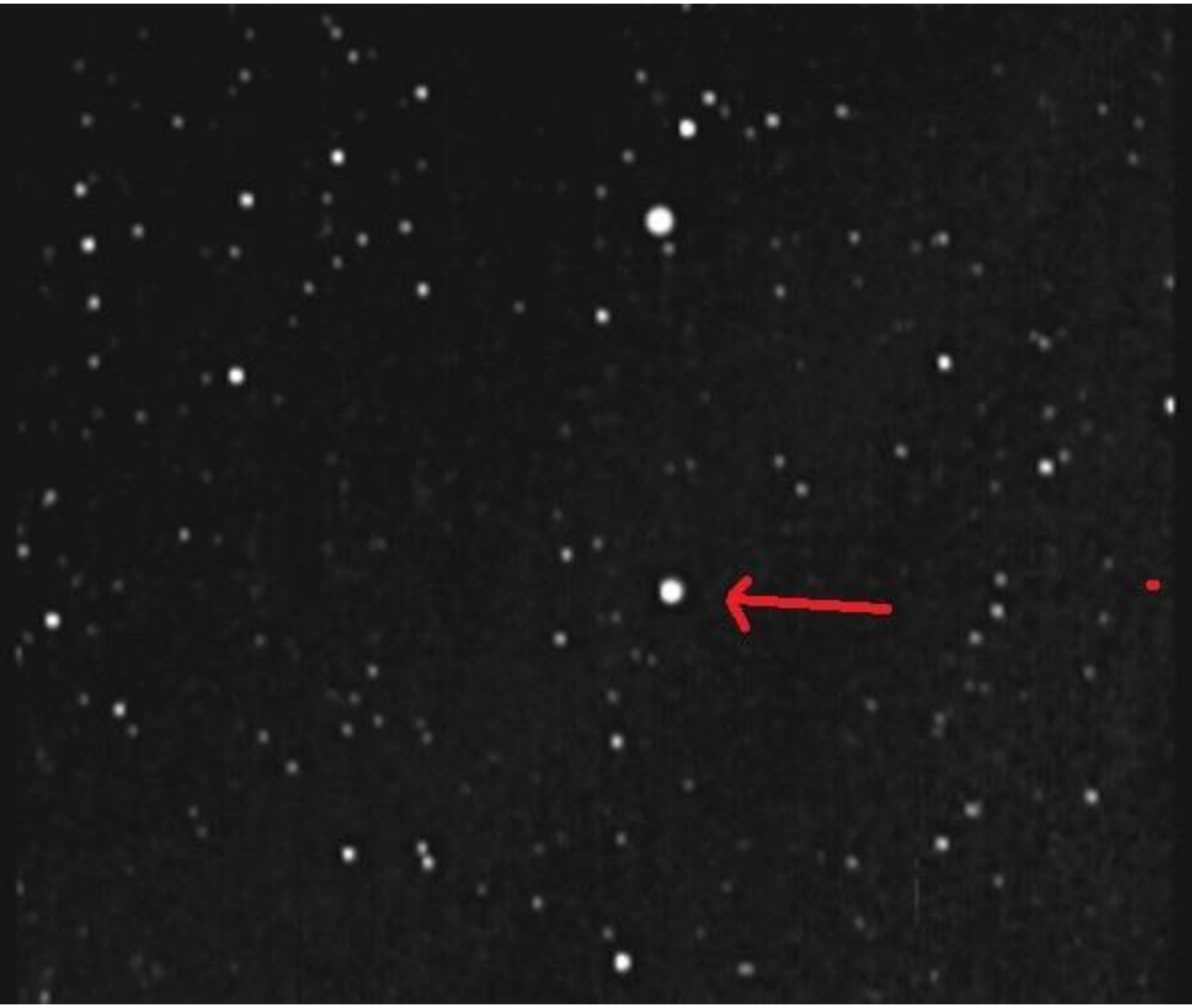
Planetary Nebula NGC 6891 is located in the Summer constellation of **Delphinus** – "The Dolphin" and is about 11,784 light years distant, and about 28,000 years old.

NGC 6891 was discovered on September 22nd, 1884 by British astronomer Ralph Copeland at the Dunechta Observatory in Aberdeen Scotland, using a visual spectroscope on a 6.1-inch refractor.

Visual Sketch:
August 19th, 1987: My backyard in Pittsburgh, using an 8-inch SCT f/10, 24mm eyepiece (85×) and UHC filter.

Video-Capture/EAA: July 7th 2010, from Cherry Springs State Park in Pennsylvania.

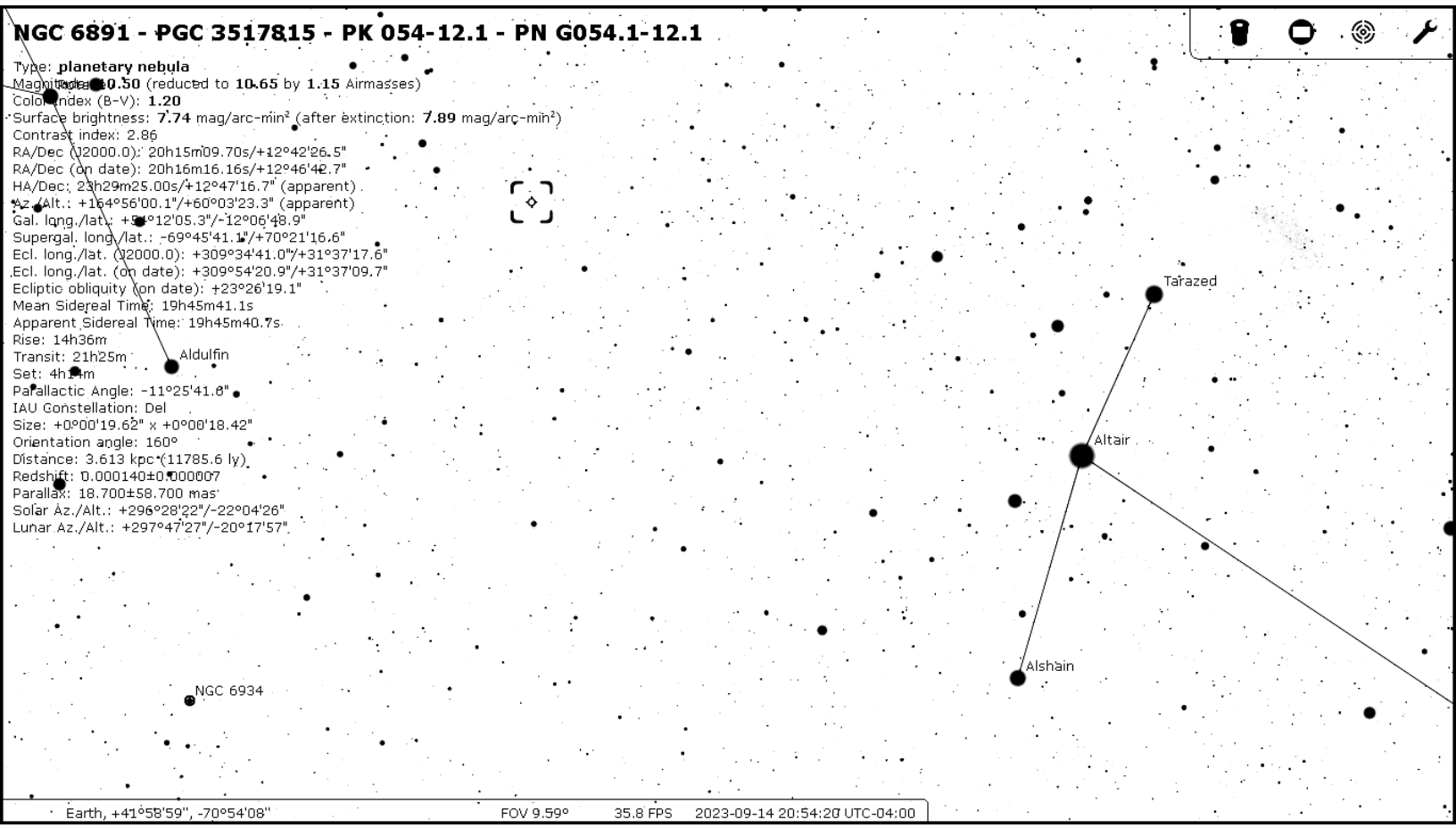
Using an 8-inch SCT optical tube @ f/6.3 on a GEM mount, with a modified analog security camera and IR filter, 8-second exposure.



Mike McCabe: Observer from Massachusetts

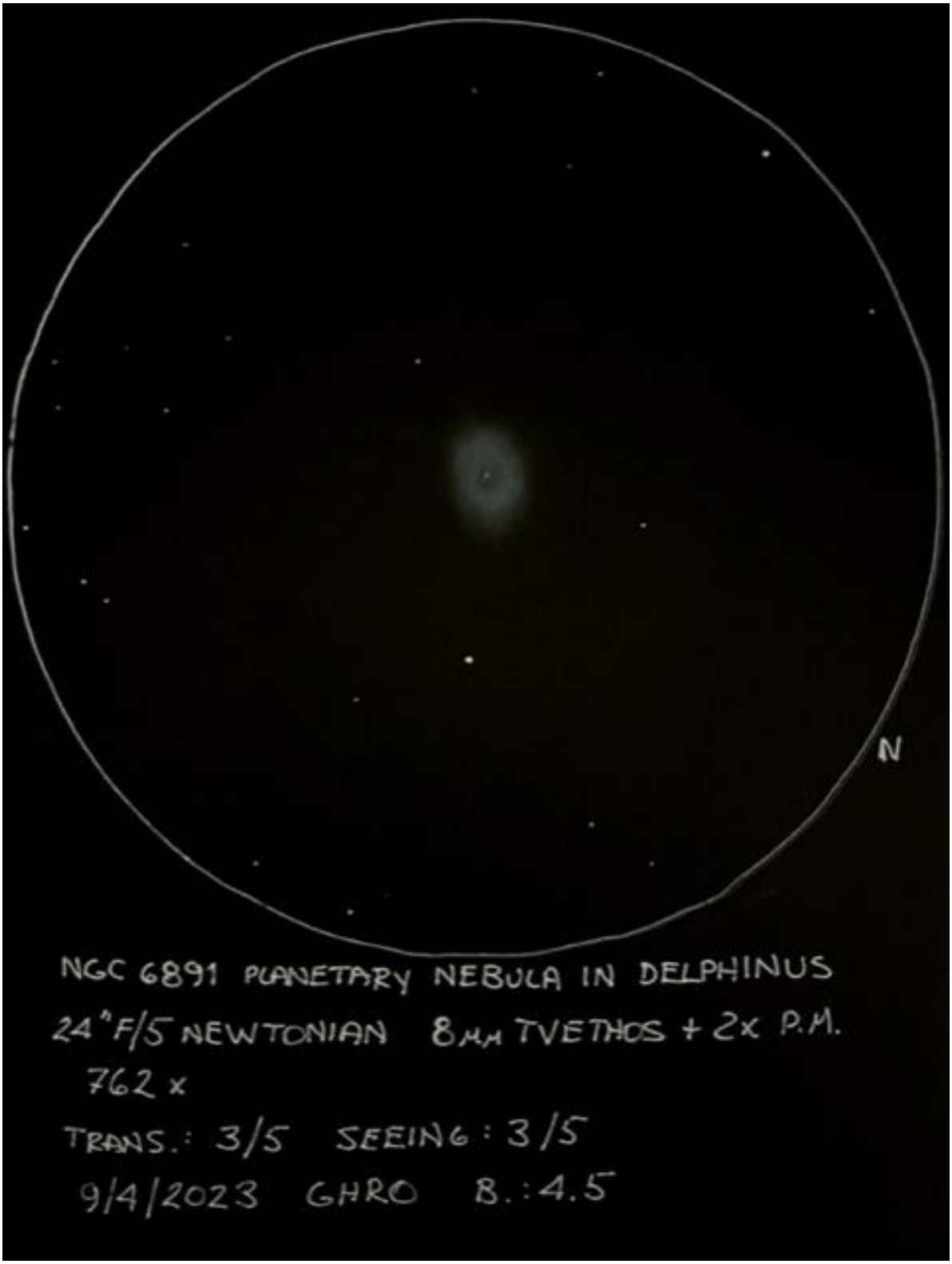
Discovered on September 22nd of 1884 by English astronomer Ralph Copeland, NGC 6891 is a small planetary nebula located in the constellation Delphinus. Like all planetary nebulae, this object is the remnants of a Sun-like star in its dying phases. Once a medium sized star consumes enough of its hydrogen and internal pressure wins the battle against gravity, the star sheds its outer layers, leaving a hot white dwarf star at the center which then ionizes the cast off gasses and causes them to glow.

NGC 6891 is located approximately 12,000 light years from us, and at that distance adopts the appearance of about 17" of an arc in diameter. While this may sound similar to the size that Saturn appears to us (less the rings), in reality it appears much smaller from a visual perspective, depending upon the size of the instrument used to view it. To experience seeing the full breadth of the object, one needs to use astrophotography to resolve the faint outer shells of the structure.



Although located in Delphinus, I found the star hop from Altair in Aquila to be a fairly straightforward process and perhaps the easier route if for no other reason than Altair was readily visible in my magnitude 4-ish sky. On the evening that I chose to take on the challenge, the sky was compromised by both smoke and passing high thin clouds making the parallelogram in Lyra incomplete to the naked eye, even while lying at the zenith. The two stars nearest the target at magnitudes 7.6 and 7.8 were difficult at best in the 50mm finderscope. As I often do for challenge targets, a finder chart was produced via Stellarium and printed on a single 8.5″x11″ sheet of paper for use at the telescope.

In November of 2021 the Hubble Space Telescope produced the most detailed image to date of NGC 6891. Data gleaned from that image allowed astronomers to calculate the ages of the various shells surrounding the remnant white dwarf, and found that they range in age from 28,000 years old to 4,800 years old. I took the known distance of 12,000 light years and average apparent diameter of 17″ and input those specs into vcalc.com to come up with an actual size of about one light-year in diameter.

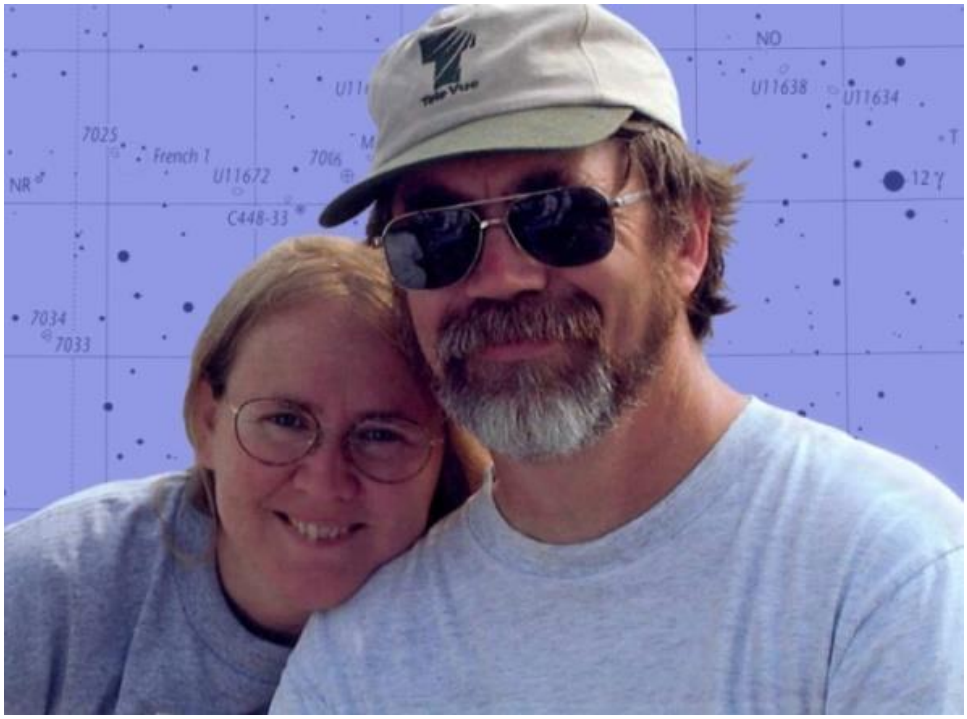


A large personal telescope used under reasonably dark skies will give you your best chance of resolving NGC 6891 even remotely close to what it really looks like. In the image above, CN'er Butch Haneuf shared a sketch that he made of the planetary nebula as seen through a 24″ Newtonian reflector operating at 762×. The small size of the target makes high magnification necessary to glean detail.

Another noted astronomical sketcher, Jeremy Perez, produced the drawing above back in July of 2008 using an 8" Newtonian reflector operating at 240x. From the expanded notes on his website it was notable to see the sky quality that he was working under; NELM 6!

My own experience from my backyard working under a Bortle 7 sky and using a 5" F/8 refractor operating at 226x was one that showed me less detail than any of the above examples. In fact the PN was difficult to discern at lower powers and at the higher power the only things in the view were a 9th magnitude star, two 12th magnitude stars and the PN itself. While the object is listed at magnitude 10.5, like many PN's it exhibits a much higher surface brightness of magnitude 7.75. On occasion throughout the observation a dull blue/grey tint was noted in condensed nebulosity.

Sue French: Observer from New York



130mm/819mm refractor:
At 63× NGC 6891 is visible as a very small, bright, bluish disk accompanied by a 12th-magnitude star about 1′ to the west-northwest. Bumping the magnification up to 102×, the bright disk is still fairly small, yet it becomes obvious and glows robin's-egg blue. At 164× the nebula's central star appears to be to be visible within the high-surface-brightness disk; jumping the power up to 235× makes this certain. The nebula shows an elongation whose longer axis, if extend, would pass north-east of the 12th-magnitude star. Judging by how many planetary-nebula disks could fit between this star and the central star, the disk is roughly 10″ across.

254/1494mm reflector:
At 164× NGC 6891 is bright and has a lovely turquoise-grey hue. Its sports a bright, oval core runs southeast-northwest within a fainter round halo. The planetary's central star is visible within.

381/1727mm reflector:
49× reveals a hue that seems robin's-egg blue to me. The bright core, approximately oval and elongated northeast-southwest, lies within a faint, rounder halo. The central star is visible.

Glenn Chaple: Observer from Massachusetts

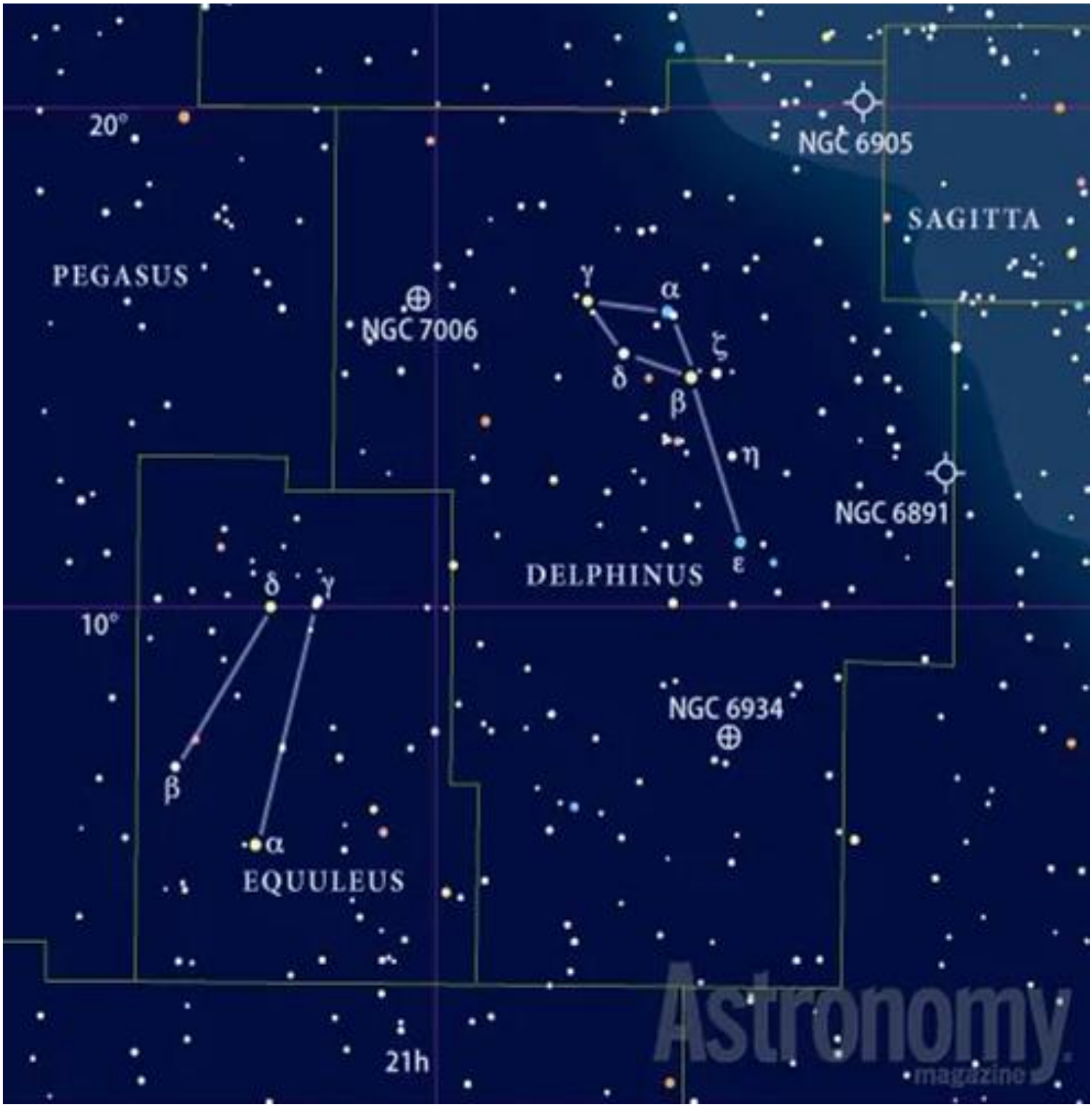
There are three reasons why a deep-sky object can be a challenge for the visual observer. It may be large and faint, it may be small and star-like, or it may be situated far from any bright guide star and hard to find. The latter two hurdles apply to this month's Observer's Challenge, the planetary nebula NGC 6819 in Delphinus.

Its 2000.0 coordinates are: RA $20^h15^m08.8^s$, Dec $+12^o42'15.6''$, about 2 ½ degrees south of 4.9 magnitude rho (ρ) Aquilae and 5 degrees east and slightly south of 5.4 magnitude eta (η) Delphini. I used the latter route when tracking down NGC 6891 with a 10-inch f/5 reflector just after midnight on July 20, 2023.

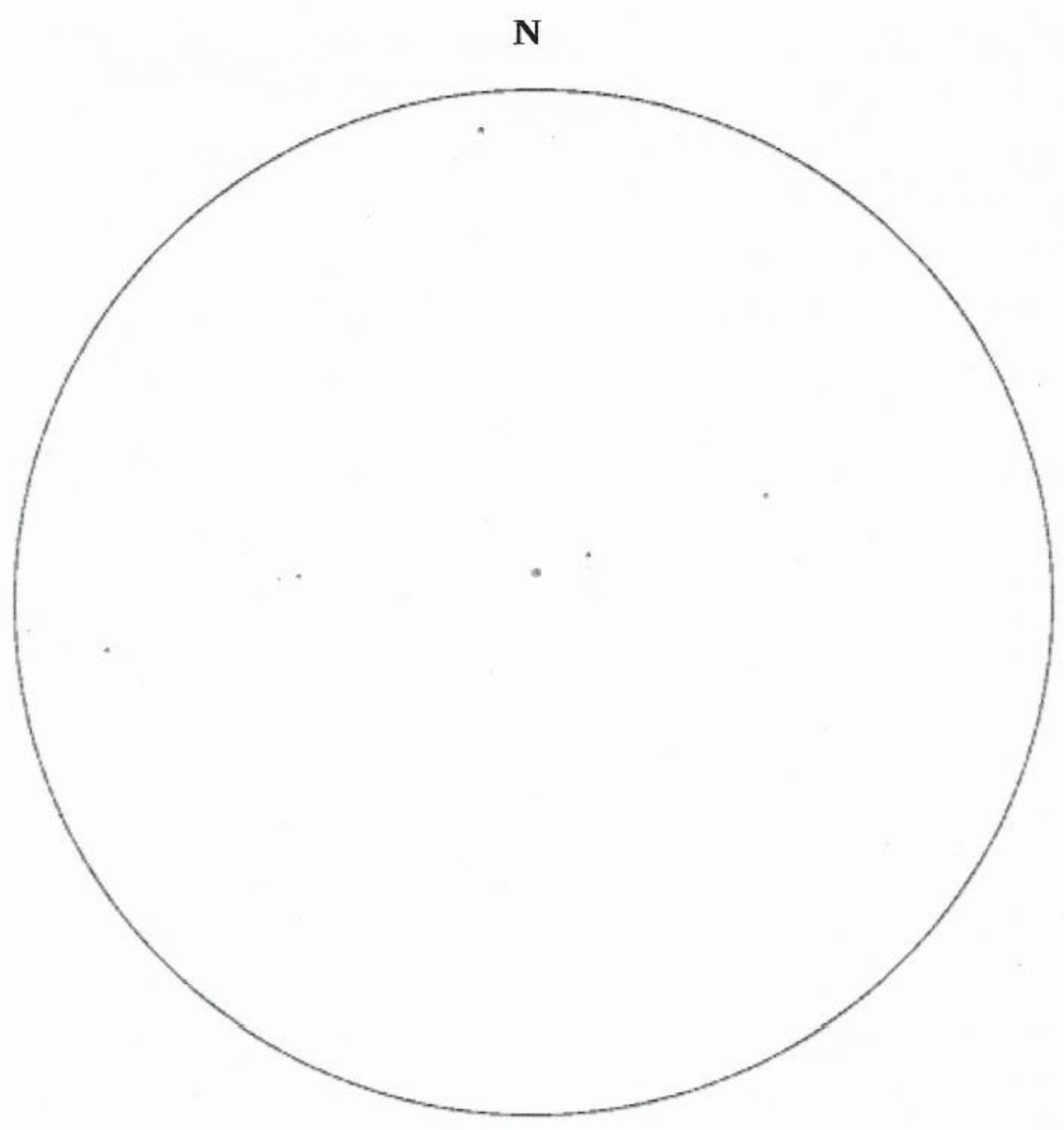
Because I use low magnification when star-hopping, I might have mistaken NGC 6891 for a 10^{th} magnitude star had I not known its precise location. Even when viewing with a magnifying power of 208X, all I could make out was what looked like an out-of-focus star. It was only when I moved an OIII filter between eye and eyepiece and the object remained bright while a 9.5 magnitude field star dimmed did I confirm its identity as a planetary nebula. I was unable to make out the magnitude 12.5 central star.
NGC 6891 is described as a "triple-shell planetary nebula." It's likely I viewed just the bright inner shell, which spans roughly 10 arc-seconds. Perhaps under darker skies, I might have made out the 18 arc-second-wide middle shell. A faint outer halo, some 80 arc-seconds across, might be picked up with large-aperture instruments.

Before leaving the area, aim your scope about one degree to the ENE. This should bring you to the pretty double star Struve 2664 (STF2664 or Σ2664). Medium aperture scopes will bring out the golden yellow hues of its magnitude 8.1 and 8.3 component stars, which are separated by 28 arc-seconds. They were a "nice sight" when I split them with a 3-inch f/10 reflector at 60× back in the fall of 1978.
NGC 6891 was discovered on September 22, 1884, by the English-born astronomer Ralph Copeland. Sources place its distance at about 12,000 light-years, but resent GAIA data indicate a closer distance of 8400 light-years.

Finder Chart



Sketch



Glenn Chaple (ATMoB) July 20, 2023, 12:15am EDT 10-inch f/5 reflecting telescope with 6mm Radian eyepiece (208×, 0.3° field) "Looks like out-of-focus 10th-magnitude star. Confirmed when OIII filter placed in front of eyepiece. 9.5-magnitude star in field faded while NGC 6891 suspect remained bright."

Mario Motta: Observer from Massachusetts

Image and details follow.

This was taken with my 32-inch telescope with NB filters (Ha, O3, and S2). Central star prominent, nice detail in the outer nebula.

This is a very bright small planetary in Delphinus, so my exposures were very short at 40 seconds for the Ha and O-III. Total imaging about 1.5 hours.

ZWO ASI 6200 camera, processed in PixInsight

Mircea Pteancu: Observer from Romania

Mircea Pteancu of Arad, Romania
affiliated to Hungarian Astronomical Assoc., Romanian Society for Cultural Astronomy,
''Galaxis'' Astronomy Club, moderator on *astronomy.ro* forum.
https://observoergosum.blogspot.com/
https://www.astronomy.ro/forum

I made my observation of the planetary nebula NGC 6891 in Delphinus on September 20. I observed from home on a sky at best Bortle 6, using my Sky Watcher Classic 250P Dobsonian and magnifications of 300×/ Lacerta 4mm UWA and 375× / TS Planetary 3.2mm, with and without the S*v*Bony UHC filter.
The NGC 6891 nebula was easy to find. At 300× it was seen as a hazy object, slightly brighter in the center, with almost constant luminosity but suddenly decreasing towards the blurred edges.

Dr. James R Dire: Observer from Texas

NGC 6891 is a planetary nebula located on the western edge of the constellation Delphinus near its border with Aquila. The nebula is approximately 15 arcsec in diameter and is fairly round. Visual magnitude estimates place the nebula between magnitude 11.5 and 12.3. Since the nebula is blue in color, these magnitudes would also be the nebula's B magnitude.

Scottish Astronomer Ralph Copeland discovered NGC 6891 in the year 1884 in Aberdeen using a 6.1-inch refractor. NGC 6891 is located near the Milky Way as viewed from Earth, but it is actually 2600 light-years above the galactic plane. Early estimates of its distance put it at 5800 light-years. More modern and accurate distance determinations have it at 12,400 light years.

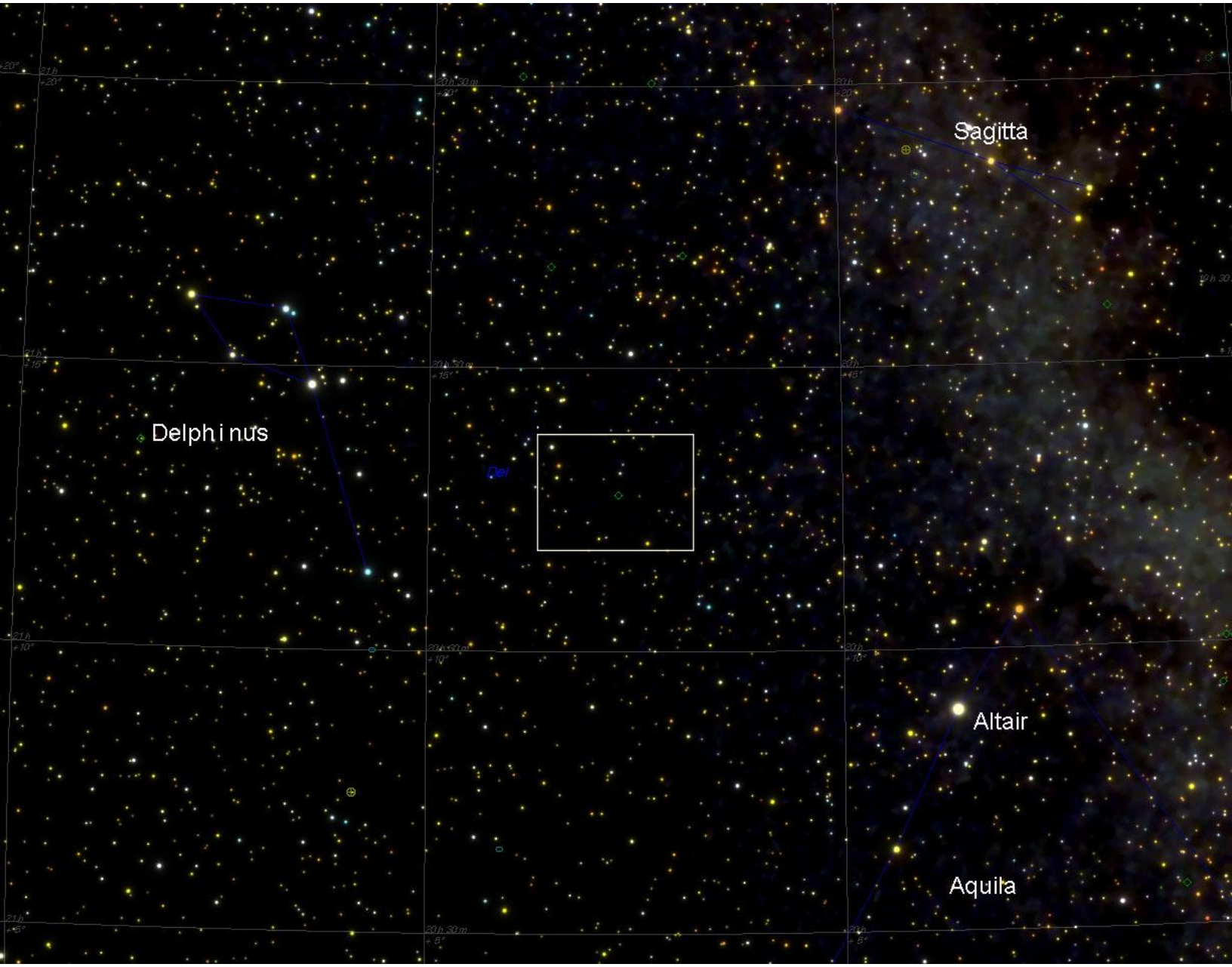
As can be seen in the below finder chart, NGC 6891 is near the midway point between Altair and Beta Delphini (the brightest star in Delphinus: slightly brighter than Alpha Delphini!) The rectangle on the finder chart shows the field of view of my attached image of NGC 6891.

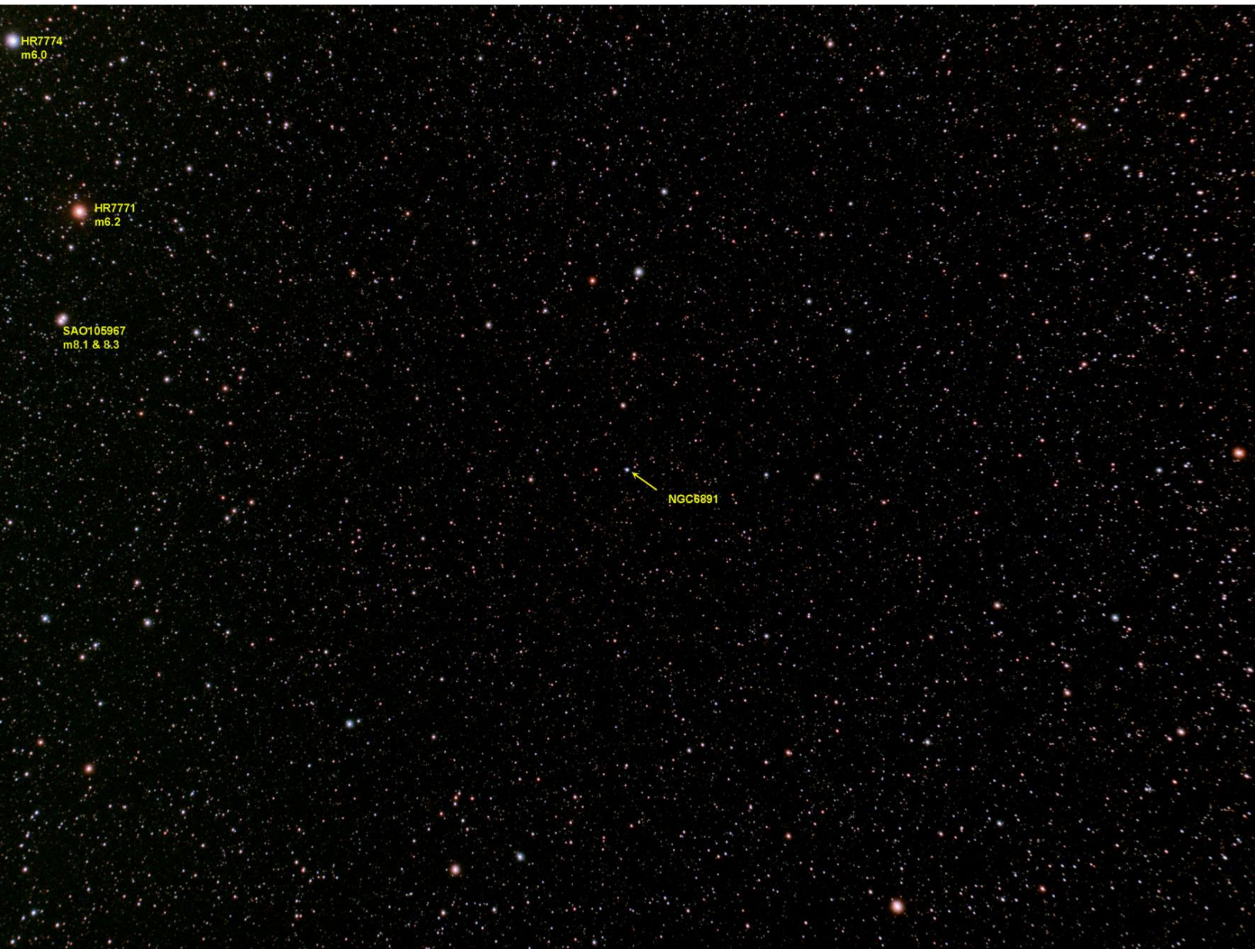
I did not have a long focal length telescope with me this month to capture an image of NGC 6891. But I did capture a wide field shot of the nebula (below) using a Stellarvue 70mm f/6 refractor with an SBIG ST_8300C CCD camera. At this scale, the nebula appears as a blue star-like object (yellow arrow) near the center of the image. In the image, north is up and east to the left. I labeled the three brightest stars in the image, including the fine double star SAO105967. SAO105967 is a pair of 8th-magnitude yellow stars separated by 27 arcminutes; a great object for binoculars or small telescopes.

Planetary nebulae form when a dying star throws off its outer layers after it has exhausted all of its core's nuclear fuel. NGC 6891 is considered to be a triple shell planetary nebula. This means the nebula contains three distinct shells of stellar gases that were expelled by the central star at different times. The halo layer is thought to be 28,000 years old, while the intermediate shell was formed 4800 years ago (these are light arrival times). The inner shell is young and its age is harder to determine using spectroscopic data. It probably is under 4600 years in age.

The central star of NGC 6891 is a white dwarf with a mass 0.75 that of our Sun. It may have been very similar to our Sun before it began shedding mass. Planetary nebulae don't last long, perhaps 10-20,000 years. At its current distance we are seeing back in time to when the planetary nebula was at its brightest. Today the star may no longer have a planetary nebula surrounding it.

Finder Chart




HR7774
m6.0
HR7771
m6.2
SAO105967
m8.1 & 8.3
NGC6891

Joseph Rothchild: Observer from Massachusetts

I observed planetary nebula NGC 6891 with my 10″ reflector in Cape Cod. This object is located midway between Altair and Gamma Delphini. It is near an asterism of 3 stars, HD 193391, HR7771, and HR 7774, which help to confirm the location.

The PN appeared as a slightly green stellar object at 53×. At 102× it showed a possible greenish disc, which was more definitive at 179×. At high power it reminded me of Neptune. No structure was noted.

Gus Johnson: Observer from Maryland

September 1993: Using my 6-inch reflector at 95×, and UHC filter looks like a small gray disc. When viewed at 59×, and without the filter, appears more star-like.

Roger Ivester: Observer from North Carolina

NGC 6891

Planetary Nebula In Delphinus

Date: August 17th 2023

Telescope: 10-Inch f/4.5 EQ Newtonian

Sketch Magnification: 256×

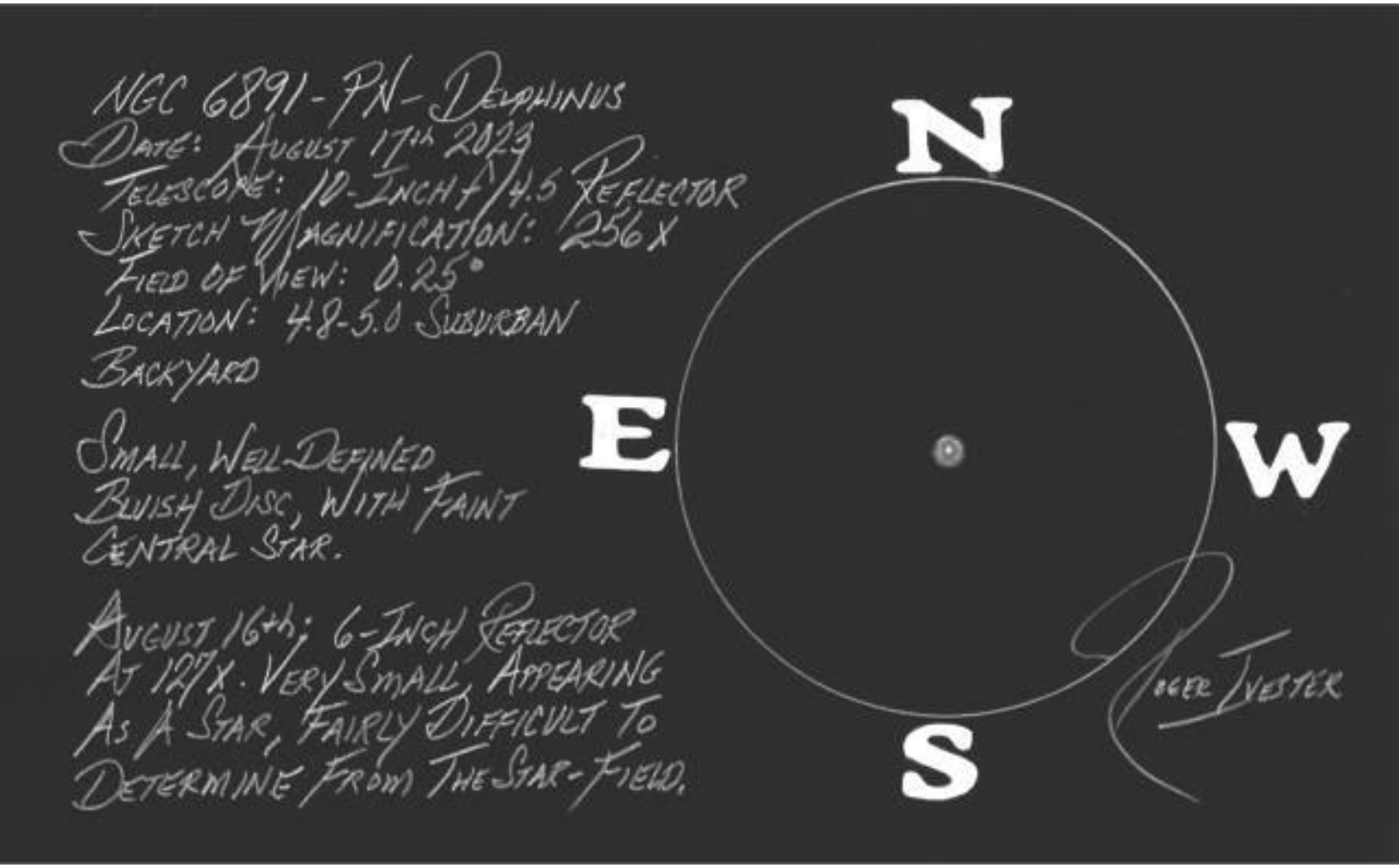
Field of View: 0.25º

Location: 4.8-5.0 NELM Suburban Backyard

August 17th 2023: Small, well-defined bluish disc, with a faint central star.

August 16th: 6-inch f/6 Newtonian at 127×. Very small, appearing mostly as a star, but with a faint halo, and fairly difficult to determine from the star-field.

Sketch Follows



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

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