MONTHLY OBSERVER'S CHALLENGE

Compiled by:

Roger Ivester, North Carolina

&

Sue French, New York

September 2020

Report #140

The Veil Nebula in Cygnus

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

The Veil Nebula has long been modeled as the remnant of a supernova explosion that occurred within an interstellar cavity created by the progenitor star. However, a recent study by Fesen, Weil, and Cisneros (2018MNRAS.481.1786F) using multi-wavelength emission maps indicates that the large-scale structure of the Veil Nebula is due to interaction of the remnant with local interstellar clouds. Employing Gaia DR2 data, the team determined an distance of 735±25 pc.

This beautiful nebula bears several NGC designations. Its western arc, NGC 6960, runs through the naked-eye star 52 Cygni and is commonly called the Witch's Broom. The tantalizingly intricate western arc is called NGC 6992 in the north, while the tattered southern reaches comprise NGC 6995. The brightest part of Pickering's Triangular Wisp, which claims no NGC number, lies between the northern tips of the two great arcs. The discoverers of NGC 6974 (Lord Rosse) and NGC 6979 (William Herschel) gave these pieces positions that don't correspond to anything obvious, but the names have been popularly tagged onto the northern and southern parts of the nebulosity just east of Pickering's Triangular Wisp. As good a guess as any.

Anas Sawallha: Observer from Jordan

This month's target proved difficult, due to my telescope having only 5-inches of aperture. The most difficult, was the Western Veil, which required averted vision. I made my sketch completely with averted vision. However, the thing that helped me is the dark location which I observe from.

The Eastern Veil was much easier to sketch, and without the use of a filter.

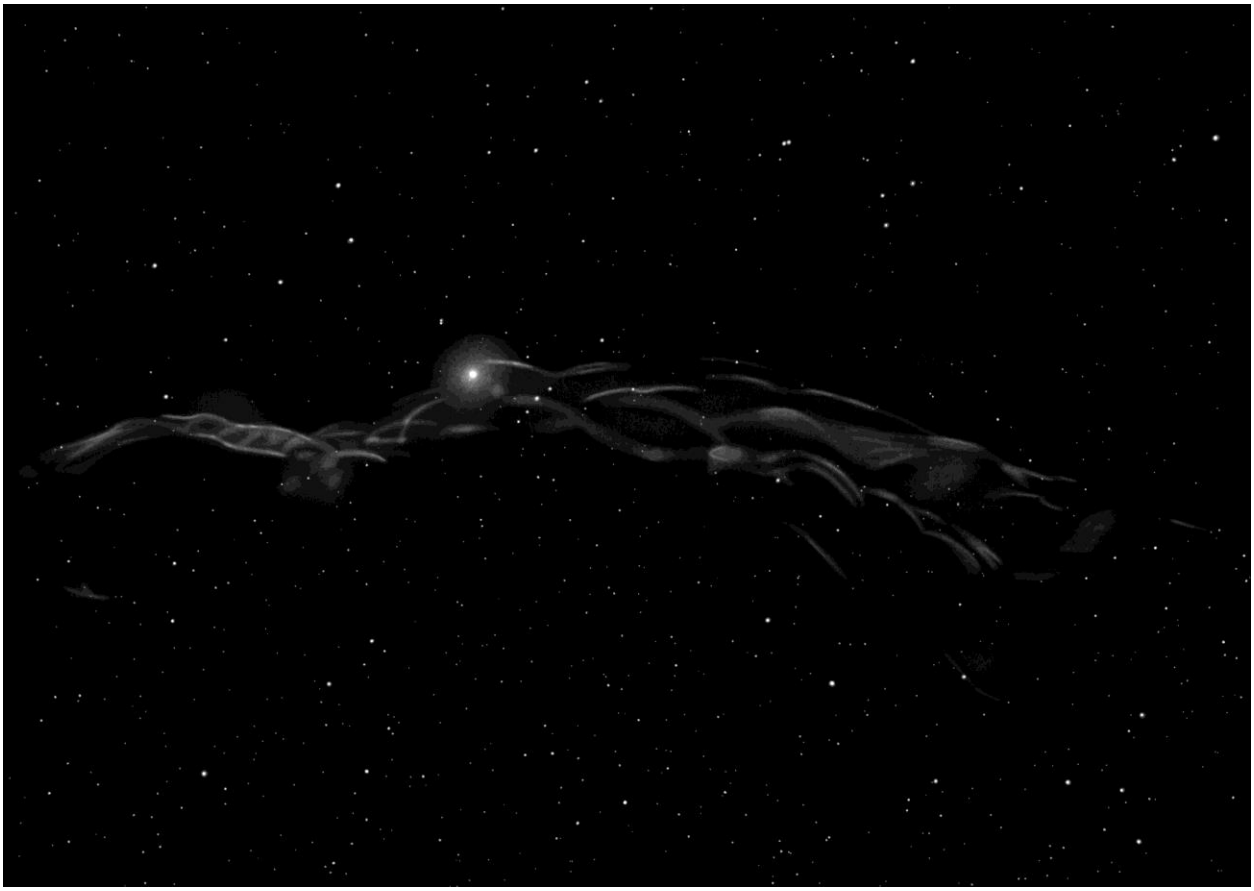
Western Veil

Eastern Veil

Uwe Glahn: Observer from Germany

Object: NGC 6992, NGC 6995, IC 1340
Telescope: 27" f/4.2 Newton. Magnification: 172×. Filter: O III.
NELM: 6.5+. Seeing: III
Location: Edelweißspitze, Sudelfeld

Object: NGC 6960
Telescope: 27" f/4.2 Newton. Magnification: 172× - 225×. Filter: O III.
NELM: 6.5+. Seeing: III
NELM: 7.0+. Seeing: III
Location: Edelweißspitze, Winkelmoosalm



Object: NGC 6960, NGC 6974, NGC 6979, NGC 6992, NGC 6995, IC 1340
Instrument: 20×125 binoculars
Field of view: 3° × 4°
NELM: 6

See sketch on next page.

The following special object a planetary nebula positioned in the northern reaches of the Veil, Patchick 27. It was discovered by Dana Patchick in 2013. As seen in the sketch on the next page, Pa 27 is the circular object above a shred of the Veil Nebula.

Object: Pa 27 (PN G075.0-07.2), Sh 2-103
Telescope: 27" f/4.2 Newton
Magnification: 172×
Filter: O III
NELM: 7.0+
Seeing: II-III
Location: Edelweißspitze
Date: October 4, 2018

The information below is from me, so it's all my fault if anything's wrong. – Sue

These coordinates will take you to the planetery nebula's central star:
20h 48m 58.6773s +32° 18′ 14.7558″

The central star of this 1.2′ planetary nebula is given a G-magnitude of 12.3 in Gaia DR2, and a V-magnitude of 13 in NOMAD. The Gaia estimated distance has a range of about 4900 to 5100 light-years.

Rony De Laet: Observer from Belgium

The Veil Nebula is one of my all-time favorite deep-sky objects. No summer goes by without a gaze at this wonderful stellar complex of faint filaments. Here is a collection of my best observations of the Veil Nebula.

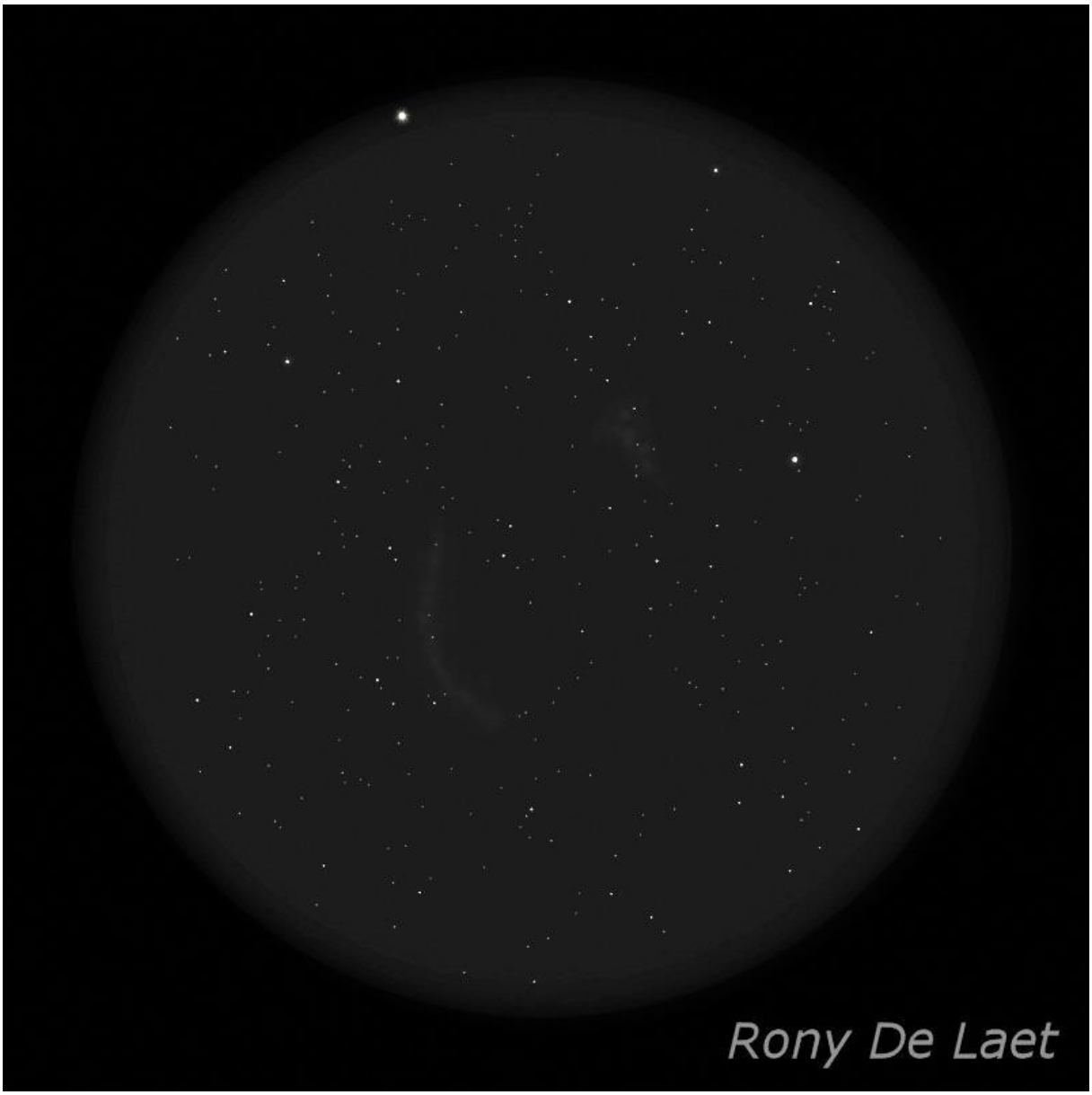
Observation with a pair of 8×56 binoculars

The Veil Nebula in Cygnus can be a tricky object to observe with a pair of binoculars, especially without an O III filter.
This supernova remnant is a delicate complex of faint light that encompasses a 3° field. Starting point for this observation is Epsilon Cygni. From there, go 3° south to find 52 Cygni. A small pair of binoculars can show both Epsilon and 52 Cygni in the same field of view.

Now try to move both stars near the western border of the field in order to see the brightest part of the Veil (NGC 6992-6992) in the middle of the eyepieces. I had to use averted vision and a lot of patience to reveal that part of the nebula. The other section, NGC 6960, behind 52 Cygni was not visible at all. I believe that the bright 52 Cygni outshines the weak glow of that part of the Veil. I did have the impression that Simeis 229 or Pickering's Triangular Wisp could be noted as a tenuous brightening of the sky. Or is it maybe the combined light of an unresolved group of stars at that spot? Detecting the Veil Complex is an interesting exercise, which I should repeat later on the year under darker skies. I do strongly recommend the use of a mount to go after the Veil Nebula. The steady view will allow your eyes to study the star field in greater detail.

Site: Bütgenbach, Belgium
Date: July 1, 2008
Time: around 23.15 UT
Binoculars: Bresser 8×56
FOV: 5.9°

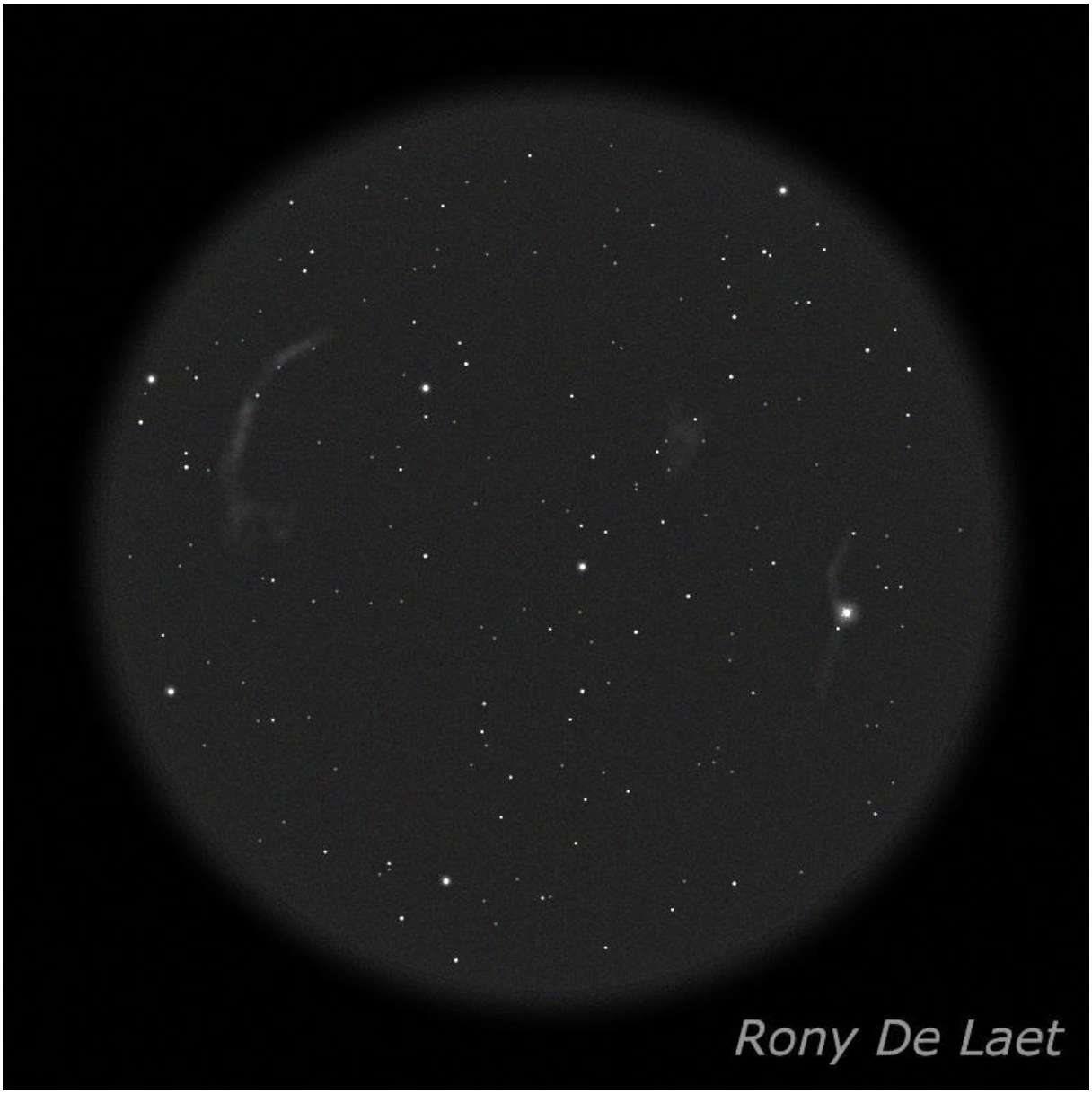
Filter: none
Mount: Trico Machine Sky Window
Seeing: 3.5/5
Transp.: 4/5
Nelm: around 5.8
Sketch Orientation: N up, W right.
Digital sketch made with Photo Paint, based on a raw pencil sketch.



Observation with a pair of 70mm binoculars with exchangeable eyepieces

Both the eastern and western segment are visible in my binoculars at 21.6×. The challenge lies in framing the full 3° of sky in one field of view. I soon realized that only my 32mm Plössls could bring this exercise to a good ending. The next evening, I set up my binoculars with the 32mm eyepieces. At 13.5× the sky looked rather bright, even with the UHC filters in place. I first tried to locate 52 Cygni, but failed. I found the eastern loop of the Veil easily. It turned out to be the brightest part of the loops. I knew that both segments must fit in the same fov. Thus the brightest star west was 52 Cygni. Detecting the western loop was difficult. The glare of 52 Cygni overpowers the subtle glow of the western loop. It takes a lot of patience to make out any nebulosity in the vicinity of this lighthouse. I must have studied the region of the Veil Nebula for about an hour when I noticed a third brightening between both loops. It is a weak patch just west of the center of the fov. The Veil Nebula is a fine object, but patience and persistence are the key to making this wide-field observation to a success.

Site: Bekkevoort, Belgium
Date: September 9, 2012
Time: around 20.00 UT
Binoculars: Teleskop Service 90° 70mm binoculars
Magnification: 13.5×
FOV: 3.7°
Filters: UHC
Seeing: 4/5
Transp.: 4/5
Sky brightness: 19.75 magnitudes per square arc second near zenith (SQM reading).
Nelm: 5.35
Sketch Orientation: N up, W right.
Digital sketch made with Corel Paint Shop Pro X2, based on a raw pencil sketch.

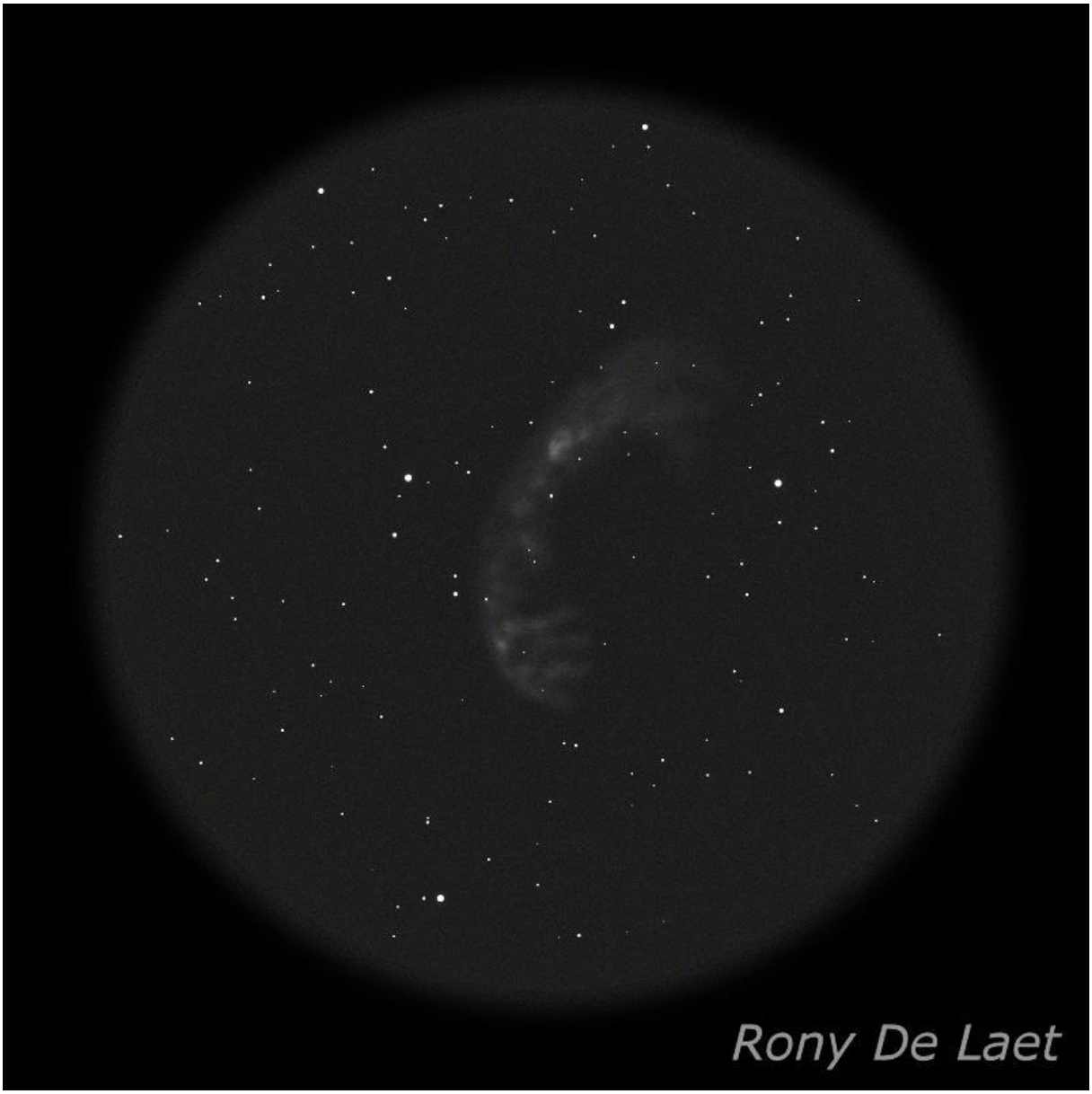

Rony De Laet

Observations with a 105mm refractor

My initial attempt was a single sketch encompassing both NGC 6992 and 6960. It was a tricky set-up at a power of 16× and both nebulae were bordering the field of view of my 32mm TV eyepiece. I had to use my UHC filter to enhance the contrast. The filter also narrowed the field a bit. So I decided to break up the scene and use the 26mm eyepiece at a power of 20×. Both nebulae also showed more detail with the 26mm eyepiece. I clearly see a brighter eastern segment, compared to a fainter western one. The star 52 Cygni kind of hides the western segment for the observer.

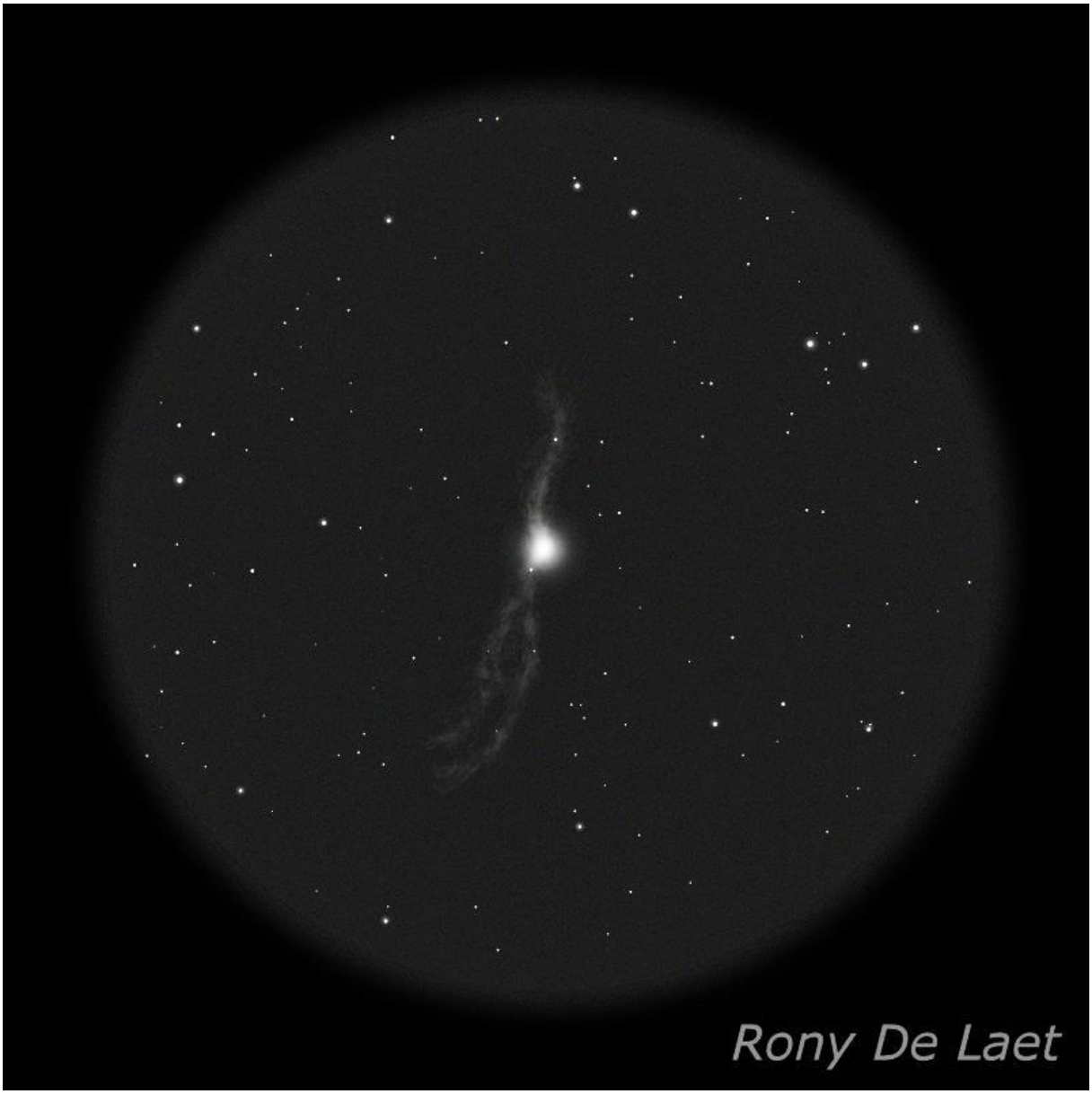
Here is the sketch of the eastern part with NGC6992 and NGC6995.

Date: September 15, 2007
Time: 22.30 UT
Scope: Sky-Watcher 102/500
Meade SP 26mm
Power: 20×
FOV: 150′
Filter: Lumicon UHC
Seeing: 3.5/5
Transp.: 3/5
Nelm: 5.2
Sketch Orientation: N up, W right.
Digital sketch made with PhotoPaint, based on a raw pencil sketch.


Rony De Laet

Here is the sketch of the western part of the Veil Nebula.

Date: September 15, 2007
Time: 23.30UT
Scope: Sky-Watcher 102/500
Meade SP 26mm
Power: 20×
FOV: 150'
Filter: Lumicon UHC
Seeing: 3.5/5
Transp.: 3/5
Nelm: 5.2
Sketch Orientation: N up, W right.
Digital sketch made with PhotoPaint, based on a raw pencil sketch.



Michael Brown: Observer from Massachusetts

I observed the Veil Nebula with my 8" SCT and 9mm Nagler eyepiece, on August 22, September 11, and September 18, 2020. I have always found the Veil to be a unique object because of its faintness, its overall large size so that only a portion can be viewed in one eyepiece field, and the slenderness of the main sections.

I find the eastern section (NGC 6992) to be the brightest part of the nebula and is clearly visible even without a filter. By moving the drive motor slowly in the right direction, I can follow the arc of this loop section over multiple field diameters, running from northwest to southeast and then southwest. The narrow, northwest section appears to be most distinct visually.

The western section (NGC 6960) has a bright star, 52 Cygni, in the foreground, making it easy to know the telescope is pointed correctly. The star appears yellow and is binary, with a dim, closely-spaced companion to the northeast. The nebulosity of this portion of the Veil is narrower and dimmer than the eastern section but still fairly easily visible. The portion north of 52 Cygni is somewhat easier to spot than the portion south of the star.

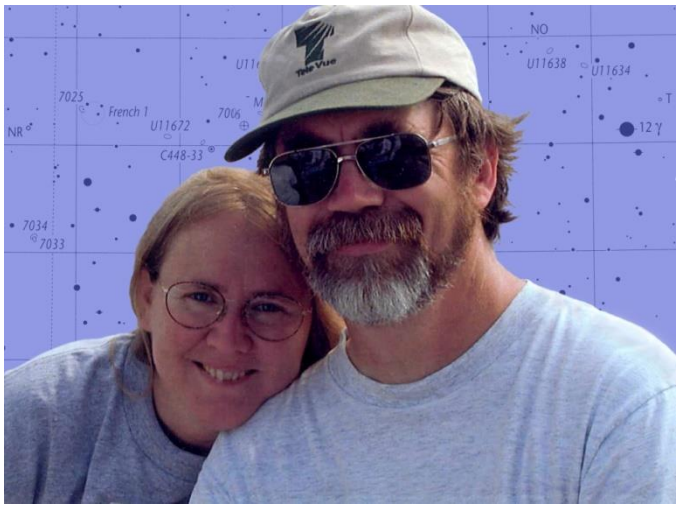
Using my UHC filter makes the Veil Nebula even more obvious by increasing contrast between nebula and background sky. The east section seems to have a texture as viewed through the filter. I also could see hints of nebulosity between the two arcs; perhaps I was seeing "Pickering's Triangle" but I am not certain.

I took photographs of the Veil Nebula on September 20, 2020. Rather than take guided photos through the telescope, my original idea was to "piggyback" my digital SLR camera on the telescope with a 300 mm telephoto lens and try to capture the entire nebula. However, I found it difficult to frame the photo such that I was confident that the entire nebula was being captured, so I decided to photograph the east and west sections separately. I guessed that 30-second exposures would not result in much drift, even without guiding, if the scope was reasonably well-aligned and the drive was running. I was mistaken, and there was considerable movement even in 30 seconds, so that the stars are far from points. Despite this flaw, the nebula is visible in the photos with fine tendrils and other details apparent. Each photo is a stack of 60 exposures for a total exposure of 30 minutes.

The photos seem to confirm my visual impression that the brightest portions include the eastern loop and the northern portion of the west loop. This was my first attempt at deep-sky

photography using the telephoto lens (I previously used it for the 2017 solar eclipse and Comet Neowise). While I think I will mostly continue to take astrophotos through the scope, I can see a place for the telephoto for wider shots, but in the future I will take guided photos (or much shorter individual exposures).

Sue French: Observer from New York



In the 1990s I grew rather tired of hearing folks say, "You can't do deep sky with a 4-inch telescope." So, I started drawing objects as seen through my 105mm refractor. The sketches included some large objects that are not only nice in a small telescope, but also can't be seen in their entirety through large instruments. These included the Pleiades, IC 1396, the California Nebula, the Andromeda Galaxy and it two close companions, the North America Nebula plus Pelican Nebula duo, and of course, the Veil Nebula. One year at Stellafane I put those sketches and others out on a table in a booklet entitled: *You can't do deep sky with a 4-inch telescope*.

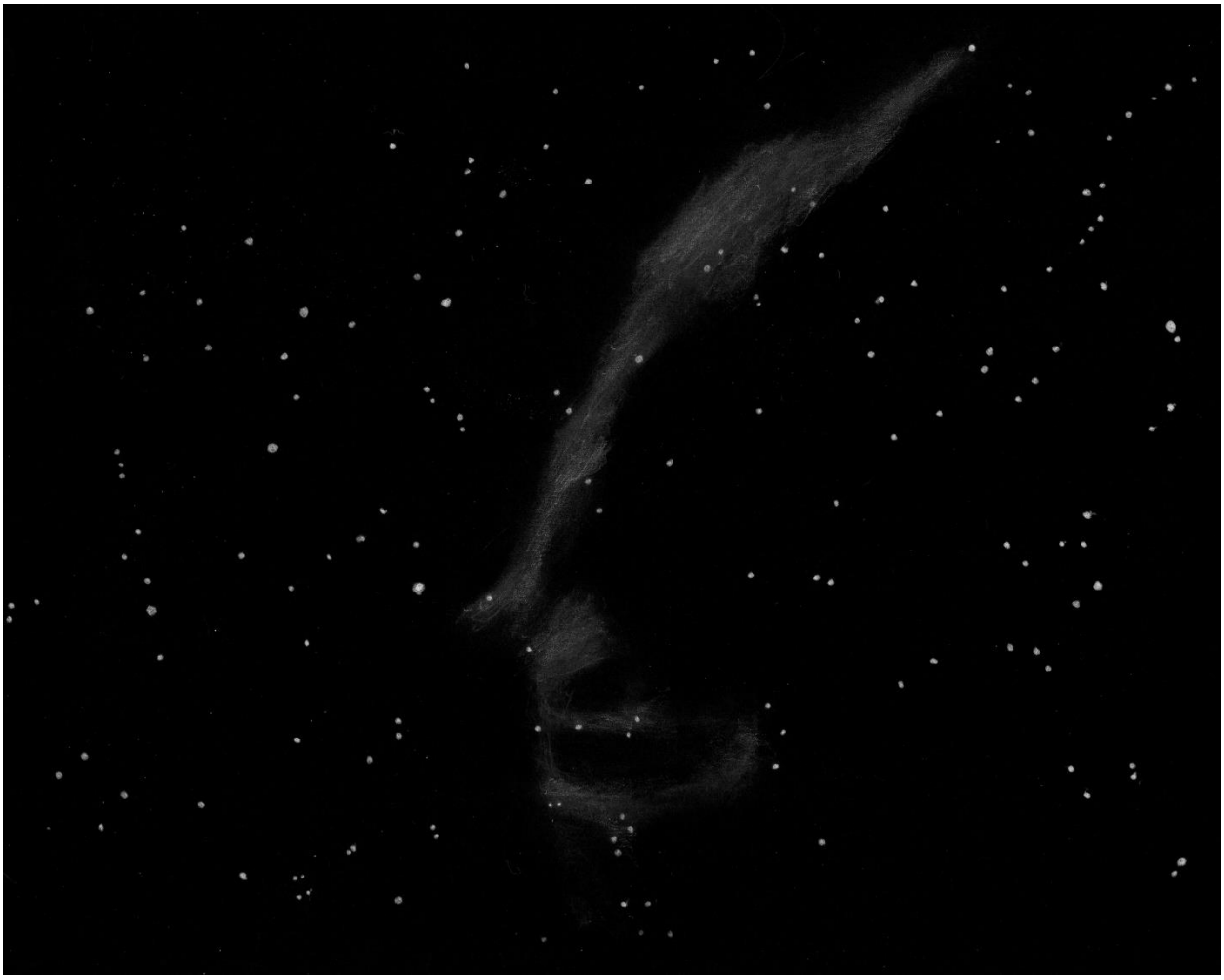
My sketch of the Veil from 1997 is on the next page.

105-mm f/5.8 refractor
Magnification 17×
Field of view 3.6°
O III filter
Transparency: good
Seeing: poor

Edward Pickering coined the term "triangular wisp" for the central section in this *AstroPhysical Journal* article: https://ui.adsabs.harvard.edu/link_gateway/1906ApJ....23..261M/ADS_PDF. Although he gives credit for its discovery to Williamina Fleming, it was common for objects to be named for the head astronomer rather than those who worked for him.

I also sketched the eastern arc of the Veil for this Observer's Challenge, since it fits nicely in the field of view at low magnification. I used my 130mm refractor at 37× and checked a few details at 48×. I used an O III filter, which is my favorite for the Veil. I'm somewhat embarrassed that I took several hours to observe and sketch this. A frequent situation for me, since I have no artistic talent.

Many more stars were visible than this sketch portrays. My view was mirrored but I flipped the sketch in a photo editor so that it matches the sky, with north up an west to the right. I also brightened the image in a not entirely successful effort to help some of the dim regions show.



Glenn Chaple: Observer from Massachusetts

Glenn Chaple: Observer from Massachusetts

A few degrees south and slightly east of the 2nd magnitude star epsilon (ε) Cygni is a large wreath-shaped nebula known as the Cygnus Loop. Two of the Loop's brightest portions form what is more commonly known as the Veil Nebula.

William Herschel discovered the eastern part of the Veil on the evening of September 5, 1784 and captured its westerly partner two nights later. He catalogued them as $H14^5$ and $H15^5$ – the 14th and 15th of his Class 5 (Very Large Nebulae) objects. Today, they are identified by the New General Catalog designations NGC 6992/5 and NGC 6960, respectively.

The best way to find the Veil Nebula is to arm your scope with a low-power, wide-field eyepiece and point it towards the 4th-magnitude star 52 Cygni. This yellow-orange K-type giant is a foreground star that lies near the center of the western Veil. Once you've spotted it, continue peering into the eyepiece as you gently nudge your scope about 3 degrees eastward and slightly north. The eastern Veil should come into view. Both portions of the Veil Nebula may be glimpsed with small-aperture scopes from dark sky areas. During the 1981 Stellafane Convention in Springfield, VT, I captured the western Veil with a 3-inch f/10 reflector and both eastern and western Veils with a 4 1/8-inch f/4.2 RFT (Edmund Astroscan).

More recently, I viewed the Veil from my backyard in suburban north-central Massachusetts (limiting magnitude 5.5). It was barely visible with a 4½-inch f/8 reflector and still faint through a 10-inch f/5 reflector. Both scopes needed an assist from an O III filter and (even better) an Orion UltraBlock narrowband filter.

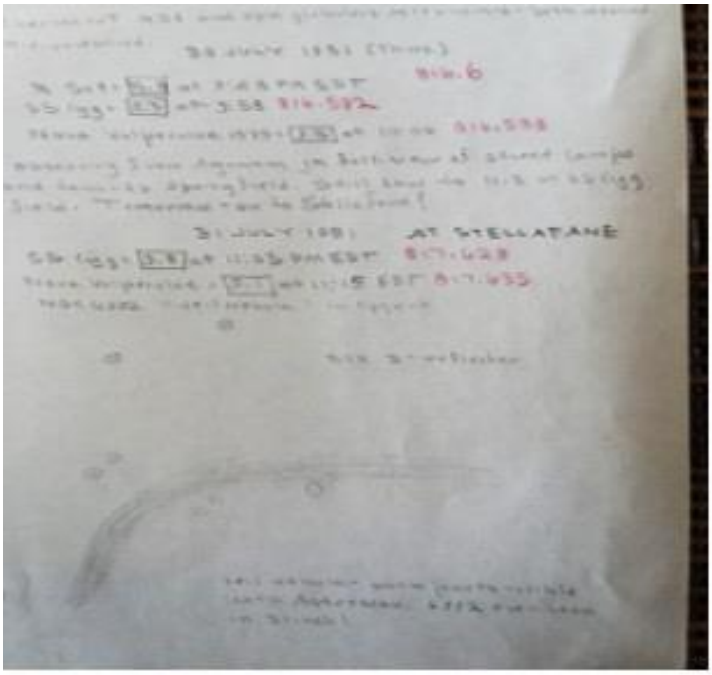
The Veil Nebula presents a variety of Observer's Challenges. It is said to be visible with the unaided eye with the help of an O-III filter and extremely dark skies. In his book Cosmic Challenge, Phil Harrington reports seeing the eastern Veil and (with difficulty!) the western Veil with 10×50 binoculars. Can you match these feats? Again, don't bother trying if you live in a

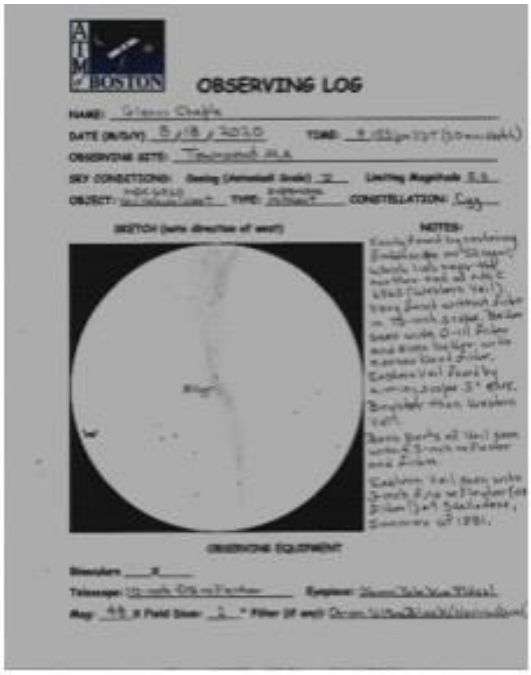
light-polluted area. Owners of small-aperture scopes are encouraged to try their luck with the Veil. Having seen it with my 3-inch reflector, I'm going to challenge my observing skills by tackling it with a 60mm (2.4-inch) refractor. Mario Motta's close-up images of the eastern and western Veil reveal their complex filamentary structure. Can you capture this visually with a medium to large aperture scope?

Three portions of the Cygnus Loop not mentioned in this article are Pickering's Triangle, located a degree northeast of the western Veil, and NGC 6974 and NGC 6979, the most northerly portions of the Cygnus Loop. What size telescope (and which filter) will give you a visual sighting?

The Cygnus Loop is a supernova remnant, the result of a supermassive star that suffered an explosive death some 5,000 to 10,000 years ago. Recent GAIA parallax measurements of stars imbedded in the Cygnus Loop gases indicate a distance of 2400 light years, suggesting a true diameter of 130 light years.

(L) Veil Nebula East, as with a 3-inch f/10 reflector at 30× (R) Veil Nebula West, as seen with 10-inch f/5 reflector at 48×. Sketches by Glenn Chaple (ATMoB)



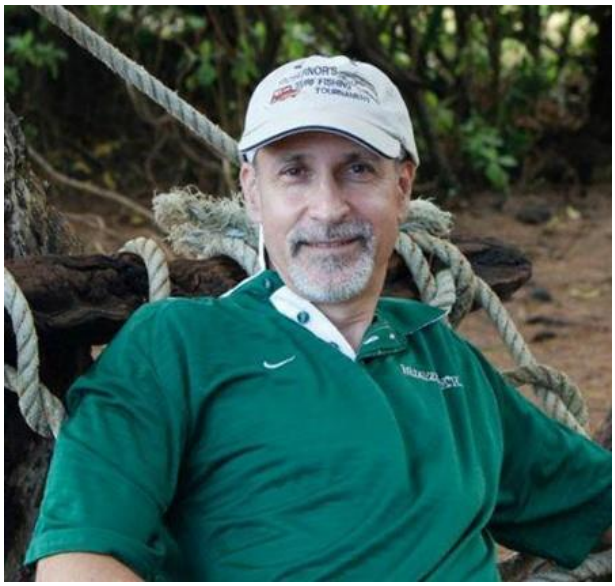


Craig Sandler: Observer from Massachusetts

9/19/2020
Petersham MA
Bortle Scale 4
Clear-Transparency very good; seeing poor; wind 7 mph gusts to 15
Equipment: Celestron 8SE f/10-Meade series 4000 zoom eyepiece at 105×

This sketch is basically a work of fiction - but based on a true story! It's a rendering of my impression of what I was seeing in the eyepiece during my first encounter with the Veil Nebula. I had no idea this was such a beguiling, complex and worthwhile object - but thanks to the Observer's Challenge, now I do! It's as much an apparition as a celestial object. I observed under very clear skies, with poor seeing, but great transparency; I don't believe the seeing degraded the experience as it would have with something stellar. This was one of those nights where observing was rewarding precisely because it was so difficult - headlights and motion-sensitive spotlights triggered by trees, and the wind, and equipment problems - and I just kept pushing through them, and was amply rewarded! The moment when I discerned the true nature of this unique object was an "old fashioned" thrill, as in the first glimpse of M13 or something like that. I spent all night (really only 90 min.) sort of dancing my scope around the pieces of the nebula, mostly with an O III filter, sometimes not, and sometimes with a Meade super-wide angle eyepiece. I have much more work to do with this object now, I realize! This sketch of one of my favorite moments of the session is a placeholder; I feel like I'm only getting started exploring the terrain of this celestial wraith.

James Dire: Observer from Illinois



The Veil Nebula, sometimes called the Great Cygnus Loop, is the remnant of a supernova (exploding star) that occurred sometime between 5000 and 8000 years ago. The explosion remnants are estimated to be 2400 light years away. The Veil is an emission nebula of hot glowing gasses, mostly hydrogen, which have not yet expanded and cooled sufficiently to dissipate. The supernova remnant is identified by five NGC numbers: 6960, 6974, 6979, 6992 and 6995. The entire complex spans a distance equivalent to six times the diameter of the Moon. William Herschel discovered the Veil Nebula in 1784, but parts of the nebula complex were cataloged by his son John in 1825 and Lawrence Parsons in 1873.

NGC 6960 is the Western Veil Nebula or Network Nebula. This arc is nearly two degrees long and 0.1 degrees wide. The brightest section is adjacent to the star 52 Cygni, a magnitude 4.2 star. 52 Cygni is a double star with components of magnitude 4.2 and 8.7 separated by 6.4 arc seconds. The star is just in front of the leading edge of Cygnus the Swan's eastern wing, or 3.25 degrees south of the star Gienah (Epsilon Cygni), a 2.5 magnitude star that marks the center of said wing. Gienah is also the southeastern star making up the Northern Cross asterism. Finding Gienah, then 52 Cygni makes finding the Western Veil easy!

The Eastern Veil Nebula goes by both NGC 6992 and 6995. It is also known as the Filamentary Nebula. The north side of the arc is visually brighter and more compact (NGC 6992), while the southern portion extends into myriad filaments (NGC 6995).

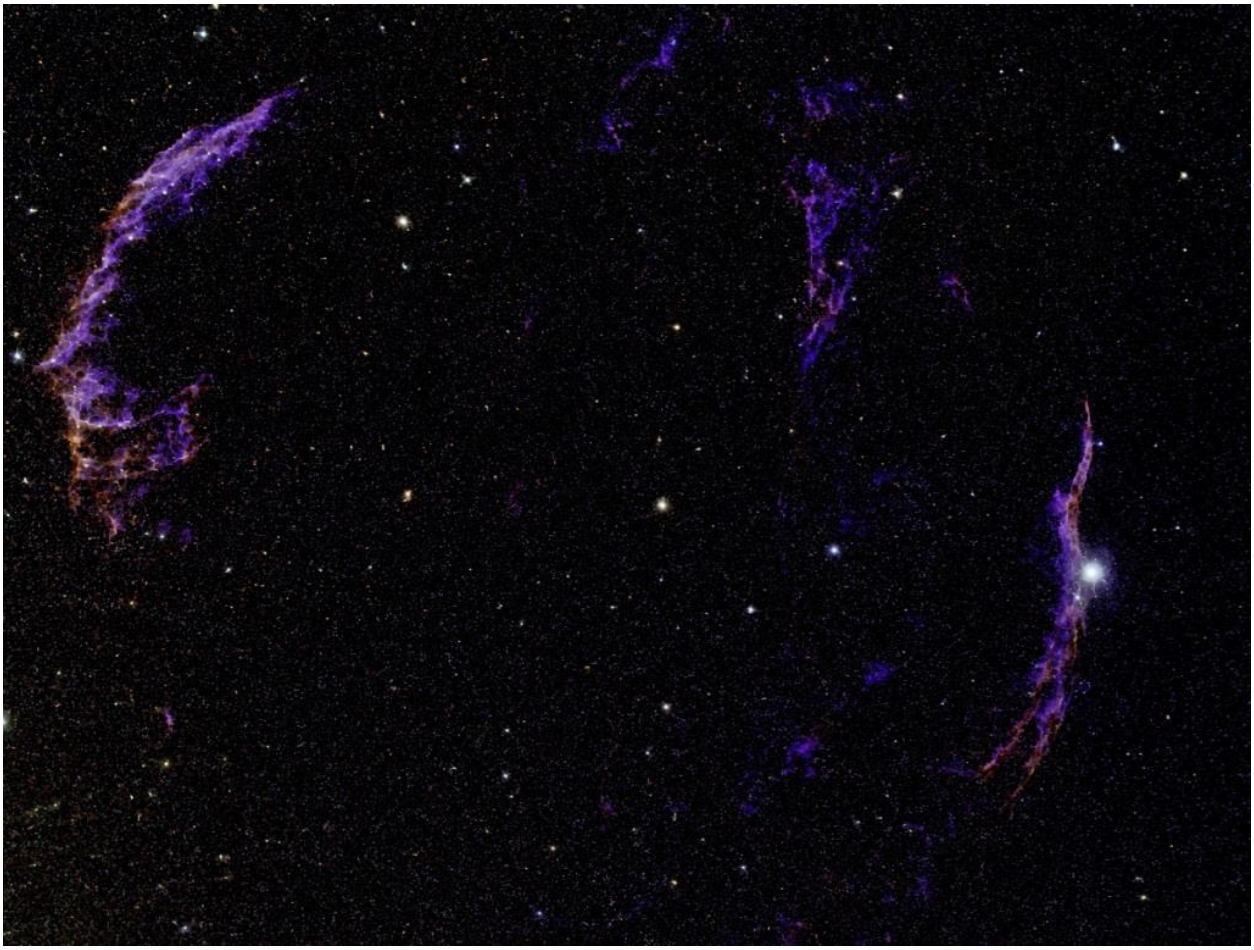
The northern portion of the nebula is split between NGC 6974 and 6979. These sections are not as bright as the Eastern and Western Veil sections, but they are not beyond the means of larger amateur light buckets. I have seen them in a 14-inch Newtonian.

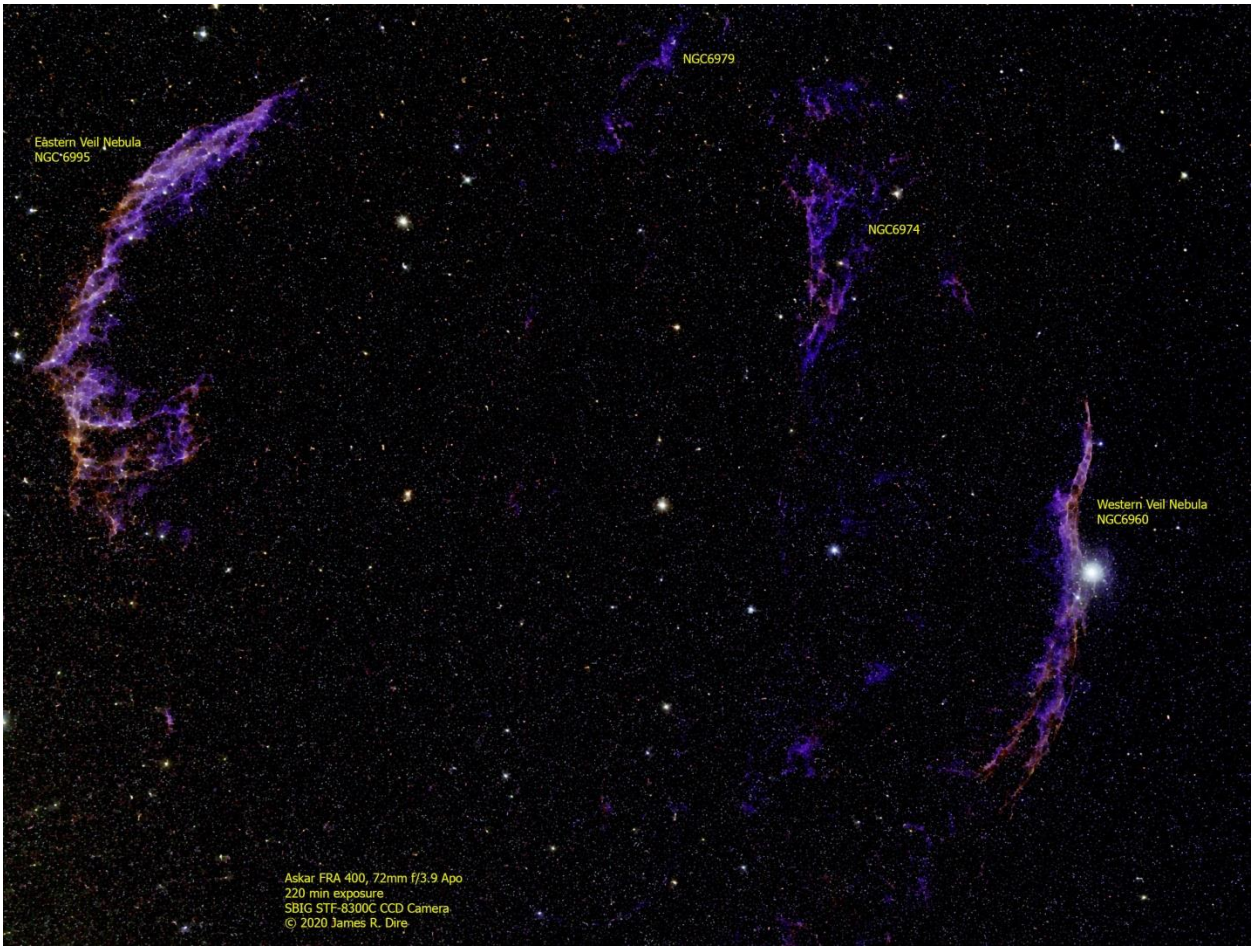
About one-third the way between the northern tip of the Western Veil and northern tip of the Eastern Veil is an uncatalogued section known as Pickering's Triangle. This slender triangular section of the remnant is brighter than either NGC 6974 or 6879. It narrows from north to south extending into a region called The Funnel.

I have viewed both the Western and Eastern Veil in a four-inch apochromatic refractor in really dark skies. Some people find the Veil easier to see with nebula filters, such as an O III filter. These filters only pass a narrow band of wavelengths, thus not all of the light emitted from the nebula reaches the eye. For some, the contrast improvement overcomes the diminished light throughput. For me, I have found observing the Veil with filters from a really dark site does not improve my ability to see the nebula. I prefer the unfiltered view.

Earlier this month, I had the opportunity to view the Western Veil through a 24-inch Newtonian. The telescope had its newly recoated mirror installed that day. The Veil was the first light with the new coating. The sky transparency was poor due to haze from numerous fires in western States 1500 miles away. So we used an O III filter to improve the contrast. The filter also diminished the glow of 52 Cygni. Only about one-third of the Network Nebula was in the eyepiece, but it was the brightest I have ever seen this section of the Veil.

My image of the Veil was taken with an Askar FRA400 refractor. This is a 72mm f/5.6 quintuplet Petzval Flat-Field Apo. I used a 0.7x focal reducer with a SBIG STF-8300C CCD camera on a Celestron CGEM II mount. The exposure was 220 minutes. This picture nicely frames the entire Veil Nebula complex.





Zoom in to at least 150% to read the labels.

Mario Motta: Observer from Massachusetts

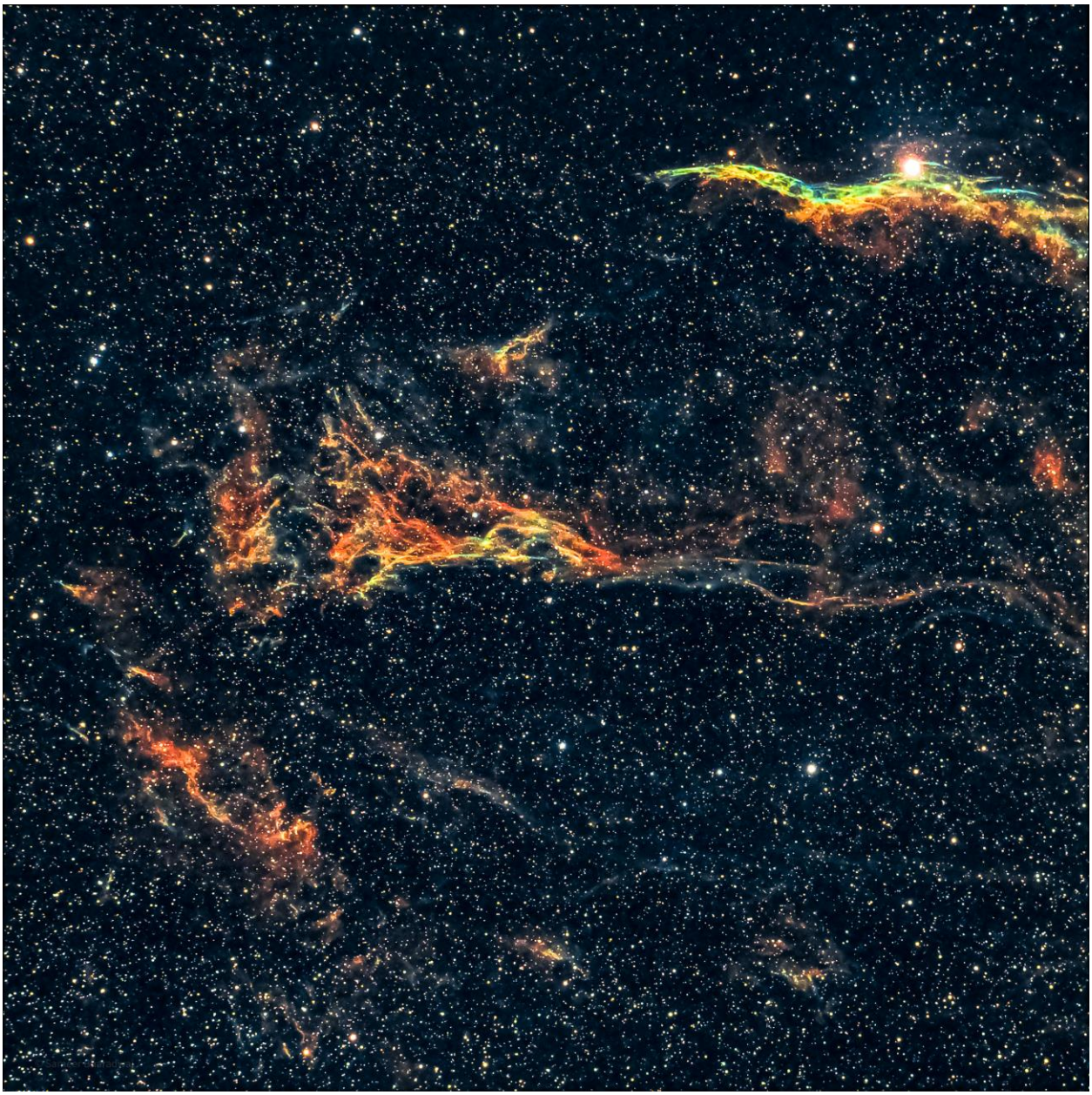
Veil Nebula East
1.5 hours Ha, 1 hour each S2 and O3 filters, through my 8-inch RC f/8 for wide field. Processed PixInsight. Very colorful because the three elements are separated very well in separate shock fronts.

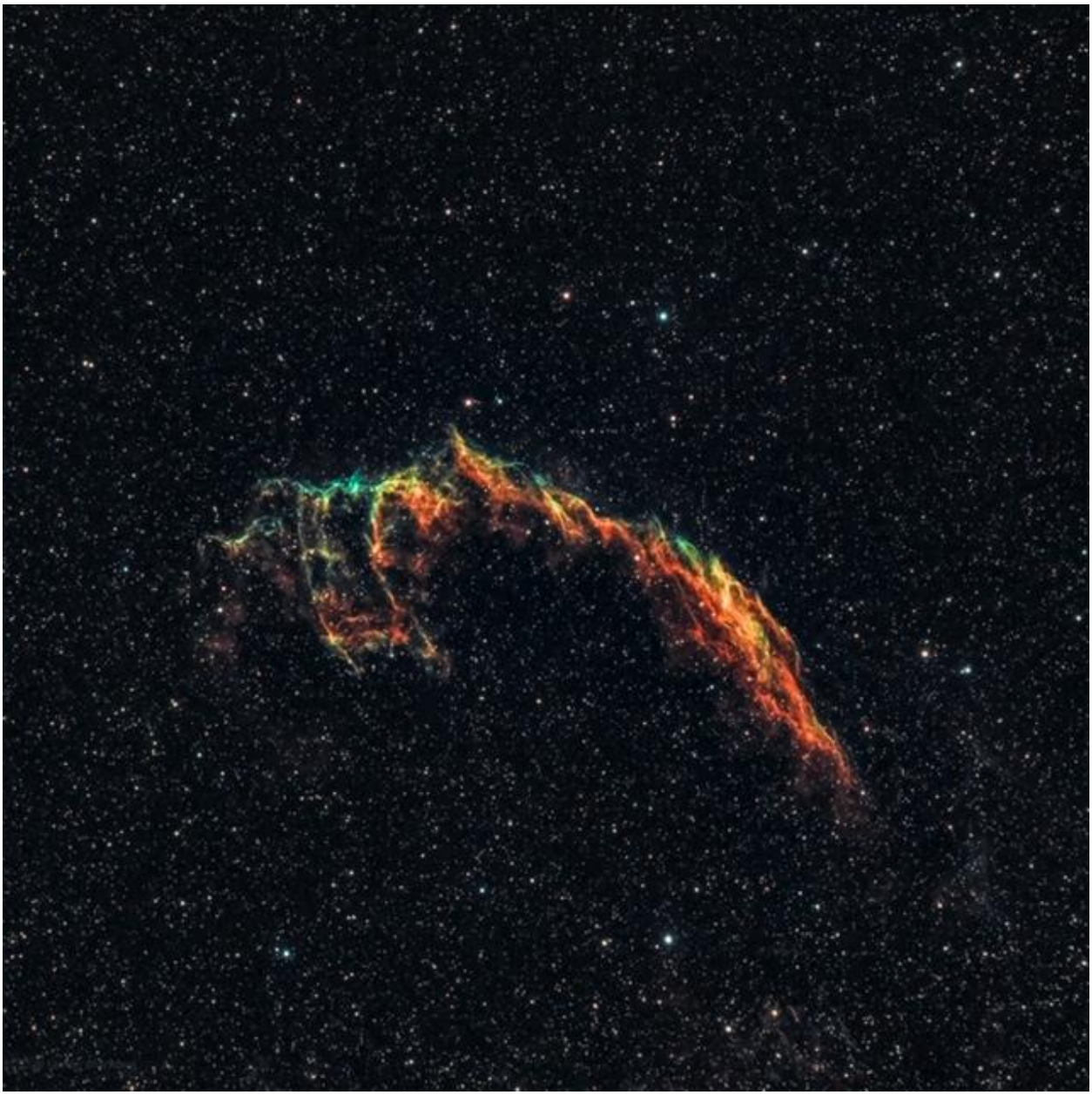
NGC 6960 (western veil), taken through my 8-inch RC, 1 hour each of Ha, and O2, and 30 min S3 filters (clouds came in for the end of the S3:(processed PixInsight)

Pickering's Triangle

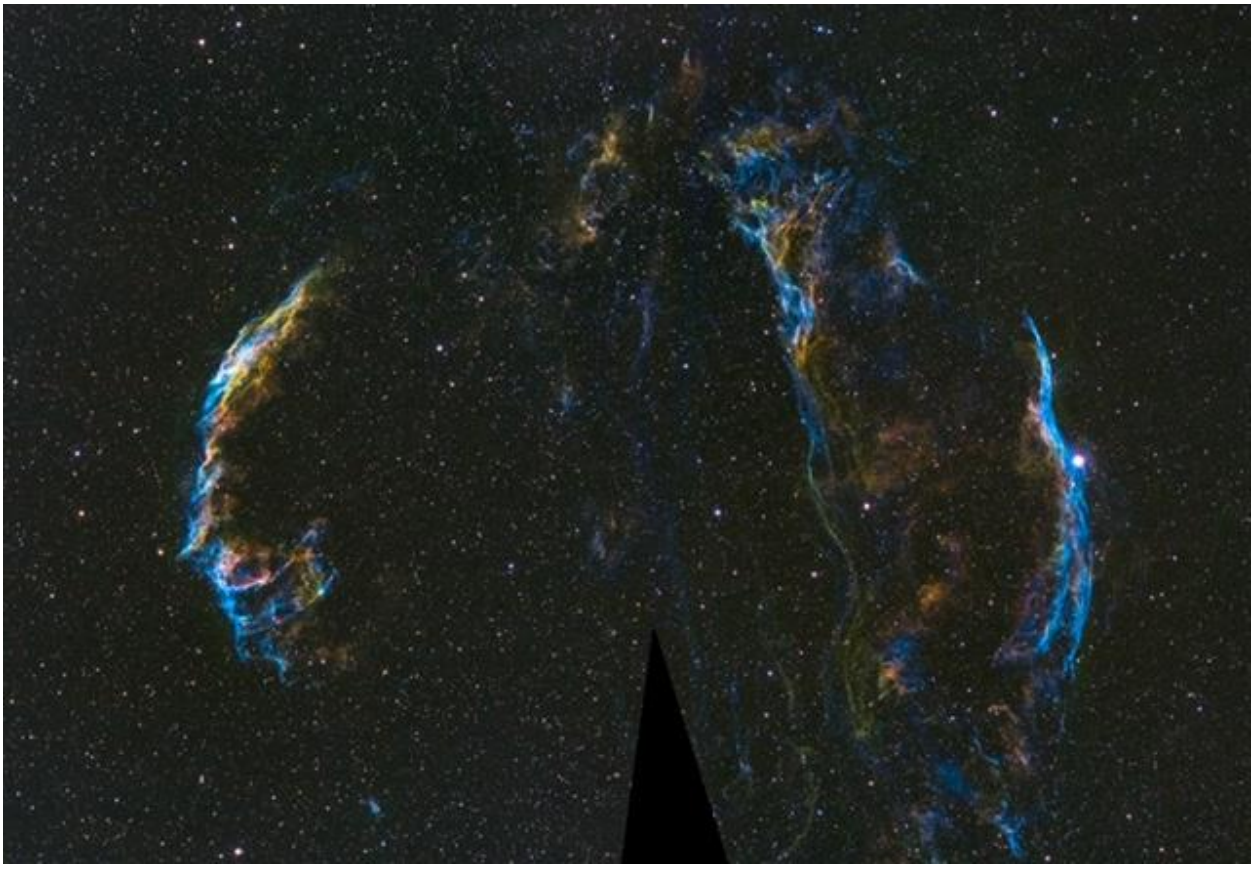
Sameer S. Bharadwaj: Observer from Massachusetts

WOGT71 with Zwo 533MC pro. A modified DSLR will also do a great job.





Mosaic in the Hubble palette



Venu Venugopal: Observer from Massachusetts

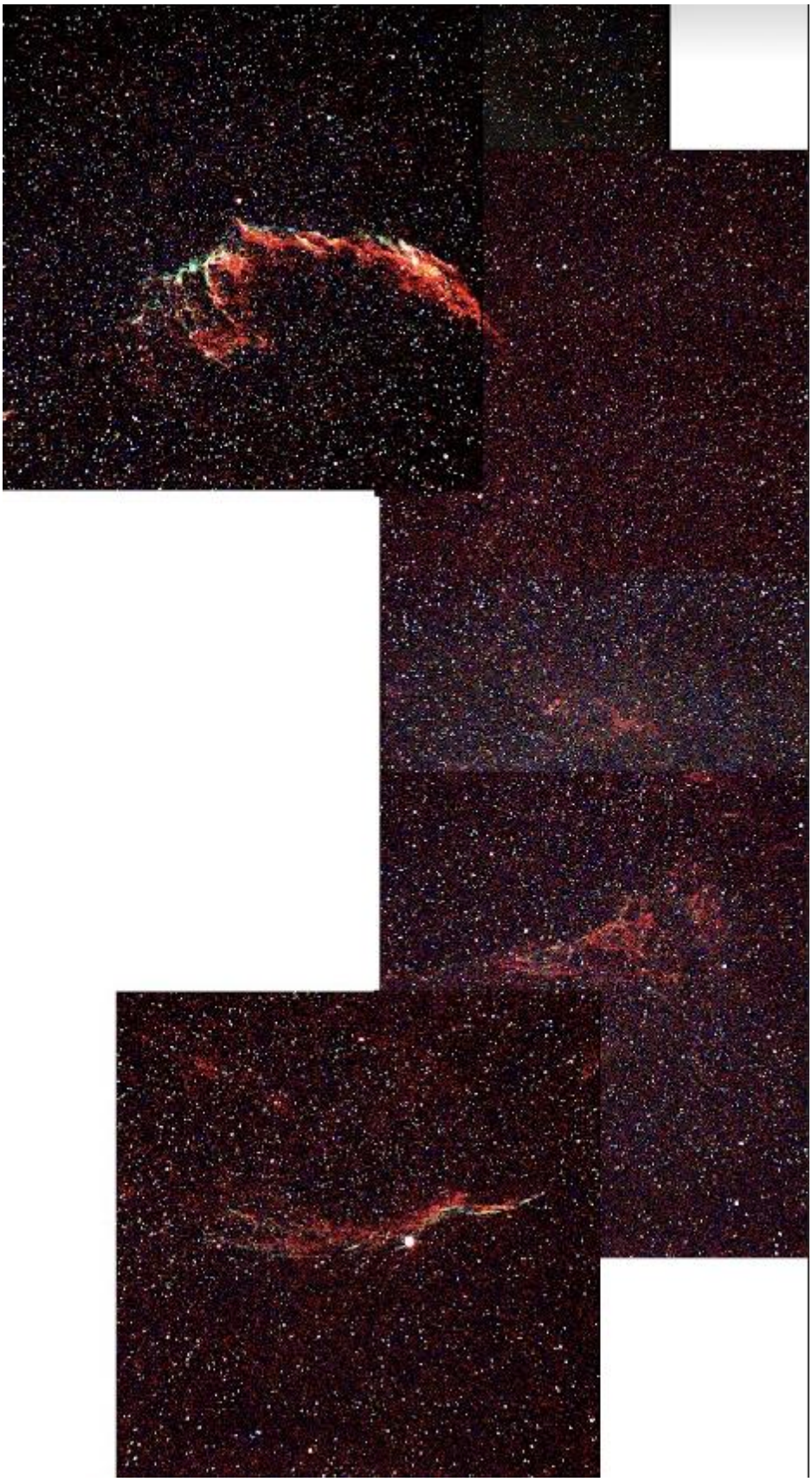
Venu Venugopal: Observer from Massachusetts

Formed about 8000 years ago, Veil Nebula and related parts of the nebula have different nicknames, some of the most famous of which include these: Cygnus Loop, Cirrus Nebula, Filamentary Nebula, Witch's Broom Nebula, Bridal Veil Nebula, Finger of God, Network Nebula etc. At the center of the Veil Nebula has a black hole created when the internal collapse of the massive star sent shock waves emanating out in all directions.

The following image was taken of the Eastern Veil with 72 ED refractor and an H-Alpha, H-Beta, O III filter (Triad) – 20 minute total exposure. The image is a composite of two images stitched side by side and requires further processing for the uniformity of the color balance.

The Western nebula was taken with an 8-inch Newtonian Reflector, again with the same filter / exposure combination as above.

This last image is just a try to get a mosaic, made from 7 images of the Cygnus loop which I could not complete due to the skies getting cloudy by the time I imaged part of the loop, taken with the 72mm ED. I included the following image as just a learning exercise.



Joseph Rothchild: Observer from Massachusetts

The Veil nebula is another summer object that I observe each year. I did plan observations this September for this report. I observed initially on September 16 on Cape Cod with my 10-inch reflector. On this date the skies were dark but the transparency was extremely poor because of smoke from the West coast fires. The limiting magnitude was 3.5. Cygnus was overhead, but Jupiter closer to the horizon was barely visible. The Eastern Veil was visible with an NBP filter. It was faint with little structure. In the Western Veil, only the brighter portions of the Witch's Broom were visible. Pickering's triangle was not seen. Without the filter only the Eastern Veil was barely visible with a 27mm eyepiece.

On September 18 the smoke had cleared with cold arctic air. There was good transparency, but intermittent clouds. With the 27mm eyepiece and no filter both East and Western Veil were seen, but no Pickering's triangle. With the NBP filter and 22mm eyepiece, both Eastern and Western Veil extended to 3 degrees and Pickering triangle was easily visible. The Eastern Veil showed numerous knots of nebulosity and the full Witch's Broom was seen in the West.

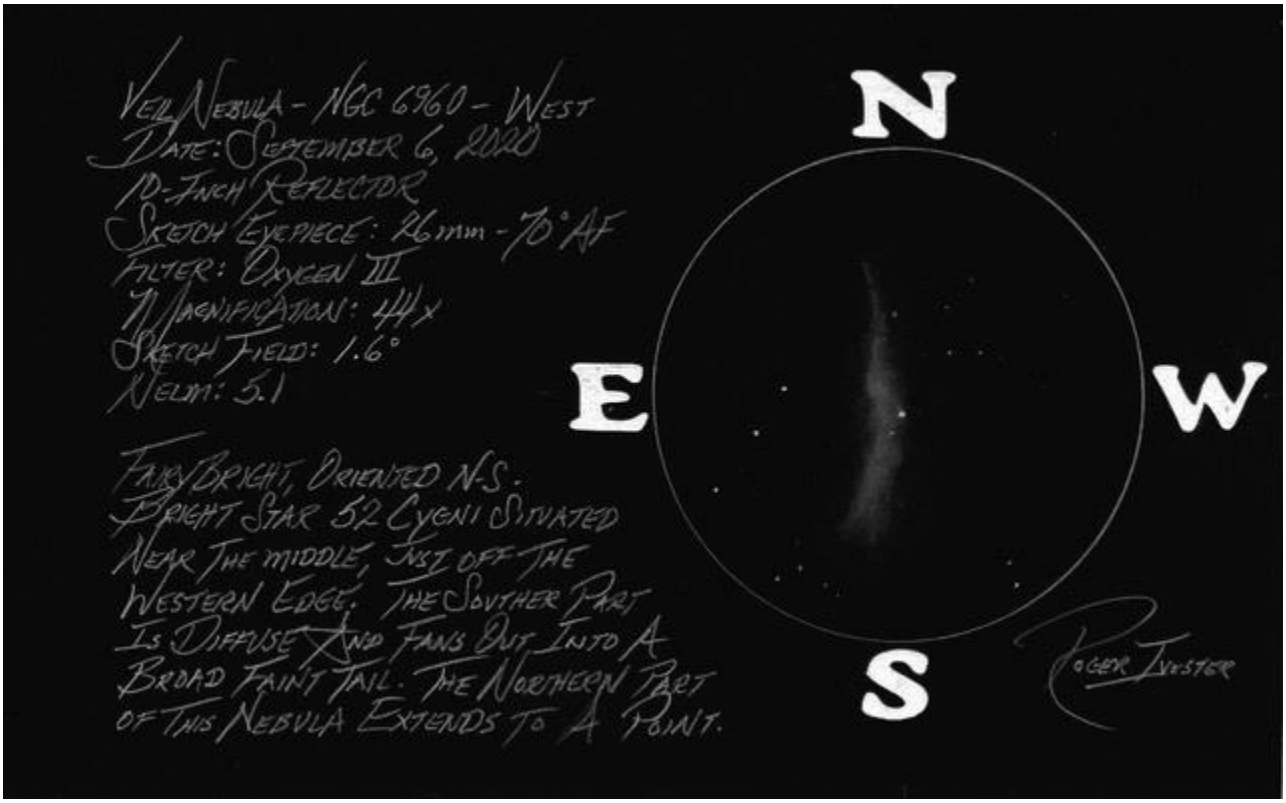
Although I did not use binoculars that night, I have recently seen the Eastern Veil in my 16×70 binoculars, but not the Western Veil.

Roger Ivester: Observer from North Carolina

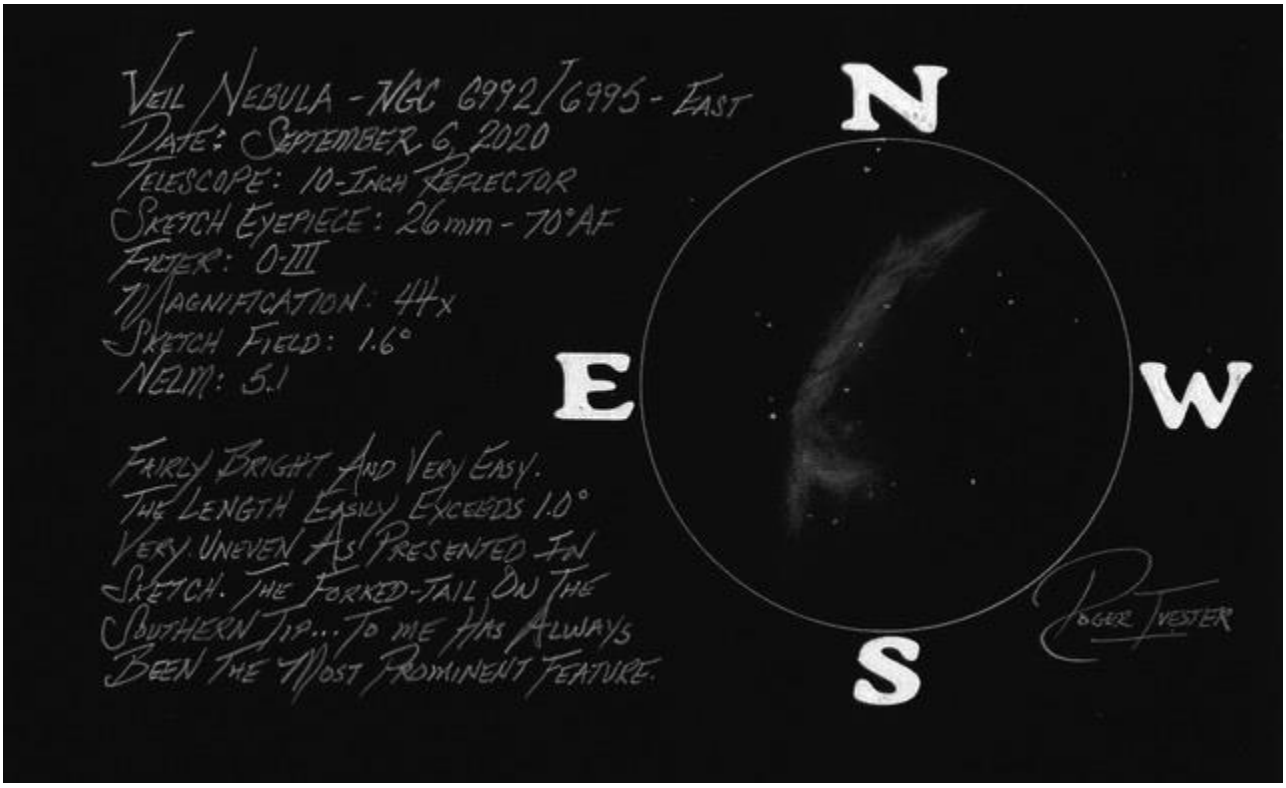
Date: September 6, 2020
10-inch f/4.5 Newtonian
Sketch Eyepiece: 26mm 70º AF
Filter: Oxygen III
Magnification: 44×
Sketch Field: 1.6º
NELM: 5.1

I have observed the Veil Nebula many times over the years, but never making a sketch due to the complexity. However, this was going to be my year for a sketch. First, I aimed my telescope at NGC 6960, known to most amateurs as the Western Veil Nebula.

Starting with a magnification of 44× and an oxygen III filter, the nebula appeared fairly bright, oriented N-S. Bright star 52 Cygni is situated almost in the center, but just off the western edge. The southern section, just south of 52 Cygni is mostly diffuse and fans out into a broad faint tail. The northern part of this nebula extends to a point. (See the following sketch.)



NGC 6992/6995, known as the Eastern Veil Nebula makes an arc, and extends for well over a degree. The most prominent part, which draws my eye immediately, has always been the forked tail at the southern tip.



The following is the complete listing of all Observer's Challenge reports to-date.
https://rogerivester.com/category/observers-challenge-reports-complete/