MONTHLY OBSERVER'S CHALLENGE

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&

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Report #131

IC 1805 Open Cluster in Cassiopeia

"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 Observers 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.

IC 1805 Open Cluster in Cassiopeia

IC 1805 is a 6.5-magnitude cluster of about 62 stars that spans 20 arcminutes. It's nearly centered on the group's brightest member, HIP 11832 shining at magnitude 7.1. The cluster is young at only 2.5-million years and we see it at a distance of roughly 6,500 light-years. IC 1805 is enveloped in and associated with the emission nebula Sharpless 2-190, commonly called the Heart Nebula, which sprawls across 1.6º of sky.

Edward Emerson Barnard discovered IC 1805 photographically and included it on the first two plates of his wonderful *Photographic Atlas of Selected Regions of the Milky Way*. The atlas can be viewed online at: https://exhibit-archive.library.gatech.edu/barnard/

Michael Brown: Observer from Massachusetts

I was not certain I would do any observing this month, as we have been having a lot of cloudy nights, and it has been an unusually cold December. I have become reluctant to brave the cold in recent years.

Tonight (12/20/19) was so clear, with no moon, and at least not quite as frigid as earlier this week, that I decided to venture out. Nevertheless, by the time I came inside, the temperature had dropped to 17 degrees F.

IC 1805 is an open cluster surrounded by a large nebula. I observed it with my 8-inch SCT and a 25mm eyepiece (my largest/lowest power), which has a field somewhat less than 1º field of view.

The cluster is fairly sparse, with six bright stars and perhaps a couple dozen dimmer stars visible. Near the center is an oval-shaped group of stars. About 1 degree southwest of the cluster is an interesting asterism of five stars shaped like a backwards "J".

A hint of nebulosity was apparent within and surrounding the cluster. This was more obvious after I put a UHC filter on the eyepiece.

Because the nebula is considerably larger than my field of view, I slewed in all directions from the cluster to explore it. In general, the nebulosity appeared to extend a couple of degrees in each direction before the sky background became fairly dark, indicating I was no longer within the nebula.

About 1 degree east of the cluster, I saw a bright star and the brightest knot of nebulosity. To the north of the cluster the nebulosity also appeared bright and mottled in some areas. In the northern area, I possibly saw a narrow filament of brighter gas, oriented east-west.

I can see why a wide-field telescope (which I unfortunately do not have) would be a good instrument for this object.

Ed Fraini: Observer from Texas

My observation of IC 1805 and its neighborhood took place on the evening of December 22 at the North Houston Astronomy Club's dark site near Dobbin, TX. We had just that one night of clear cold sky following the passage of a cold front. The sky conditions were recorded at the end of the observing session and are reported as follows: The overhead sky measured 17.45 SQM, transparency above average with three stars magnitudes 6.1 to 6.3 in Cassiopeia visible with direct vision, and seeing excellent from sunset throughout our observation. Both Vega and Capella were bright and steady at sunset, and they were used as the Sky Commander alignment stars for the 20-inch dob.

The observing plan was to locate IC 1805 as quickly as possible after sunset, which was at 2330 GMT. Then to determine how soon nebulosity could be detected as the sky darkened.

Time 0010 GMT:
Not yet astronomical dark, with strong twilight to the west. Cassiopeia is high towards the north. 40mm eyepiece giving a very low 48×: IC 1805 stands out well, counted 17 stars of which most appeared to be close in magnitude and color. Only three stars exhibit a slight yellow hue. The cluster is well separated from other field stars making it easy to identify. This cluster would be classed as widely dispersed in my judgment. It seems lines would be the characterization of the organization of the stars in the group, and many lines are moving across the field from the central area. Already we can see nebulosity, very light but there, to the north and east out towards NGC 1027. I was very surprised that the nebulosity was so detectable this soon after sunset.

Time 0020 GMT:

I moved IC 1805 off to the northeast out of the field of view until Mrk 6 appeared in the 40mm eyepiece. Mrk6 is a beautiful small asterism that I will refer to my fellow observers as

“The Worm.” A quick look at 142× revealed no color and equal magnitudes for this collection of stars.

Time: 0025 GMT:
Now moving back to IC 1805 with the 40mm eyepiece, the cluster is now much more distinctive, and the nebulosity very evident. I can now count 30 to 35 stars in the field, and it still seems very dispersed. A broader range of colors was observed at this time.

Time 0032 GMT:
Even though the nebulosity to the east is strong, I installed the O III filter, which significantly enhances the appearance of the nebulosity for the whole field. The sky background is growing darker, and there are three bright areas of the nebula that can be noted. These are mainly on a north-west to south-east line from NGC 896, which is bright through IC 1805 and on to the west to another bright nebula area near NGC 1027. We can follow the opacity from NGC 1027 to IC 1805 very quickly now. While there are several bright areas, we could not get a sense of the “heart” shape while looking at these relatively small fields of view. We spent quite a bit of time trying to sort this out from the larger pattern of the heart nebula.

Time 0100 GMT:
Looking at IC 1805 at with a 26mm eyepiece (without the O III filter) gives us an exit pupil of 6.7mm, which is a good match for my dark-adapted eye. Concentrating on IC1805, we can now count 65 – 70 stars, many of which are very dim. The nebulosity band is substantial to the north and thins out over the cluster. I worked my way stepwise up to 320×, in a failed attempt to see the companion to HD 15558. An interesting note, HD 15558, is listed by Wikipedia as being one of the most massive stars in the Milky Way. I identified three nearby stars at magnitude 11 that were barely visible, and the companion is reported to be much fainter. Under increased power, the star group in the center of IC 1805 looked more rectangular in nature with an L/D of 3. HD 15558 is midway on the long side bottom.

Time 0120 GMT:
Wrapped observation of IC 1805:

To our surprise, it was easy to detect the nebulosity of this extended object quite soon after sunset. It was also a surprise how difficult it was to keep my orientation while trying to trace out the heart which we are so all familiar with, as shown by our astrophotography friends.

Vladislav Mlch: Observer from Massachusetts

Date: Nov 30 and Dec 28, 2019
Location: White Mountains National forest, New Hampshire
Conditions: Bortle 2, below average seeing
Telescope: 22-inch f/3.3 DOB with 10mm eyepiece (100º apparent field of view) (185x – FOV 0.54º) Night vision intensifier with 1.2× Barlow (92×, FOV 0.43º)
Filter: 7nm H-alpha used on the NVI

I was able to sketch only the central portion of the cluster. There seems to be patterns of many arches, all consisting of mostly mag. 5-6 stars.

There was no sign of nebulosity when using a regular eyepiece. I was able to see some nebulosity with the night vision intensifier, coupled to a 7nm Ha filter. The true field of view of the DOB was too narrow to see the entire nebula at the same time.

John Bishop: Observer from Massachusetts

I observed IC 1805 on two nights, 11/30/19 and 12/19/19, from the ATMoB Clubhouse in Westford, MA. Both nights were clear and cold, dropping to 18º F on 11/30 and 10º on 12/19. Unfortunately, transparency and contrast were only fair at best. I observed with my 8.25-inch f/11.5 reflector (210/2415mm) at 48×, 80×, and 100×.

Star-hopping to a sparse open cluster in this congested area of the sky was a bit of a challenge. Cassiopeia is chock full of clusters, nebulae, and background stars. A Telrad got me to the general area, but my 7×50 finder showed a field with numerous fuzzy areas and knots of stars. Which one was IC 1805?

Using my finder and motor drive, I moved from spot to spot, and then observed at 48×. The first cluster I landed on was a sparse open cluster with a conspicuously bright central star. This proved to be NGC 1027. I moved to another nearby object. This looked like it could be IC 1805, which it was. Out of curiosity, I turned to yet another nearby fuzzy, starlike object. This was Markarian 6, an unusual cluster of six or so stars in a curving line. Markarian 6 is so distinctive in its appearance that it was an ideal navigational mark, from which I could verify my location. (I was alerted to Markarian 6 by Luginbuhl and Skiff, later confirmed with an online image). In my finder, NGC 1027, IC 1805, and Markarian 6 formed a triangle that I could traverse with my motor drive (no Goto).

On the advice of other observers, I used the lowest power, widest FOV eyepiece I have to observe IC 1805. This is a 2-inch 50mm eyepiece providing 48× with a 1 degree FOV. I have no filters for the 50mm eyepiece. 48× unfiltered showed 10 or so brighter stars, widely spaced against a dark background, with some fainter stars about. On the first night I could see haze concentrated around several of the stars in the center of the cluster, but I could not see extended nebulosity. This was the same at 80× and 100×, unfiltered, with 1.25″ eyepieces. The most I can say was that there may have been brightening of the background which could have been nebulosity, but my FOV was too narrow to be sure. On the second night, I was prepared to try Roger Ivester's sweeping technique, but the sky was badly washed out due to snow cover reflection, and it was too cold for extended experimentation.

On 1.25-inch eyepieces, UHC and OIII filters at 80× and 100× were not much help. For one thing, the FOV was even narrower. Although the stars were still visible, the images were dark, and not pleasing. I thought I saw faint differences in brightness in the area around the central stars, but the image was too dark and faint to be useful. Bear in mind that transparency and contrast were compromised, especially on the second night.

All in all, a good exercise in "celestial navigation," not much success in seeing the faint, fuzzy stuff.

Yet – an interesting thing happened as I was packing up on the second night. One of our club members was allowing fellow observers to look through his 3× "night vision image intensifier" (NVII). When my turn came, I pointed the device at the region of Cassiopeia I had been observing with somewhat meager results. I was stunned. There, hanging in the sky off Epsilon Cassiopeia, were the two nebulae associated with IC 1805 and IC 1848. They were amazingly large and bright, at 3×.

I had never used one of these devices before. I am still trying to sort out what this almost magical technology means for traditional observational astronomy.

Richard Nugent: Observer from Massachusetts

IC 1805 is a VERY challenging object from my home observing site of Framingham, MA. This site offers a NELM of about 4.9 on the very best of nights. Snow cover reduces it to around magnitude 4! The observing site of the Amateur Telescope Makers of Boston offers a slightly darker sky with a NELM of about 5.1 or 5.2, but very dark skies are preferred for this object.

I had an opportunity in November to attempt an observation of this object from Framingham. I was using my 20-inch Dobsonian which is equipped with an internal filter slide holding UHC and OIII filters. This telescope achieves its richest field configuration when I use my 21mm 100° eyepiece. This yields a magnification of 120× and a true field of view of 0.83°.

The cluster associated with IC 1805 is easy to locate; however, with this setup I could see absolutely no trace of nebulosity. Filters did not improve the detectability of the nebula. I tried increasing magnification to darken the background to no avail. The telescope has a 90mm finder that gives 20× and a 3° true field. Considering the large size of this nebulosity, I tried viewing it with this little scope. No luck. I added UHC and O III filters and again, no luck.

As a test, I swung the scope to the Veil Nebula. Using the finder with the UHC filter the western portion of the Veil was easy visible. The eastern portion and the nebulosity between the east and west regions was faint but definitely visible. The aperture of this scope proved to be too small to drive light through O III filter. The failure to detect IC 1805 leads me to believe it is extremely faint!

In December, I brought an 8-inch f/4 scope to the ATMoB site. While the stars appeared steady, the seeing was actually quite poor. However, using an UHC filter and an eyepiece that gave 50× and a true field of 1.6°, I was able to see some extremely faint nebulosity surrounding the cluster. Switching to the O III the nebulosity was brighter but still very difficult.

Much to my dismay, I saw no trace of the arcs of nebulosity that lie about ½° to the east of the cluster.

In my humble opinion, in order to detect this object visually, you'll need to use an aperture/eyepiece combination that gives low magnification and a large true field of view. Once on the cluster, use UHC and/or O III filters to enhance the nebulosity, and as always, try to observe under the darkest skies you can find.

Corey Mooney: Observer from Massachusetts

On December 19th I had the opportunity to view the heart nebula using Vladislav Mlch's Gen III night vision device. He had it set up for hand held use with a 3x lens (75mm) and H-alpha narrowband filter. It was like a magic eye loupe revealing the true nature of the night sky, laden with numerous H-alpha regions everywhere I looked. A truly remarkable experience!

At the time, the heart nebula was nearly over head so I had to crane my neck to see it, but the sight was worth it. Both the heart and the soul were clearly visible with great contrast. The heart was distinctly heart shaped with a bright outline and central band.

On Dec 20th before setting up my EAA equipment at the clubhouse I tried to observe the heart visually. I used my 80mm f/7.5 ED refractor with a 50mm 2-inch eyepiece and a UHC filter. This resulted in a wide 5° FOV at 12× with an exit pupil of 6.6mm, which could drive a lot of light through the filter.

I was able to see some very faint nebulosity around the central star cluster. I also saw the fish head (IC1 795) as a detached area of concentrated glow, definitely brighter than the glow around the central cluster. I did not see the fainter heart shaped outline, even after panning around and jiggling the scope with averted vision.

On December 28th I live-stacked the heart nebula with my new IMX294 based camera in my 208mm f/3.9 Newtonian. The new camera has a much larger sensor than my IMX224, resulting in a much larger field of view, but I was still only able to fit a choice part of the massive heart nebula into the FOV. I chose to frame the bright central cluster of the heart and the nearby fish head nebula.

In the short 8-second frames the red nebulosity was visible around the central cluster and the fish head, albeit very noisy. Once the live stack was started, the grainy noise started to fade and I could stretch the histogram to cut the sky glow and reveal some of the fainter outline as more

frames accumulated. There are wonderful wisps of nebulosity tangled in the central star cluster. The illumination/ionization from the blazing stars gives a very 3D effect to the gas and dust.

The outline of the heart was much fainter. With aggressive stretching it could be separated from the background, but I settled on a smoother more natural look. The fish head certainly lives up to its namesake, complete with a gill plate, lips, and an eye. It reminds me of my large pet goldfish.

Halfway between the central cluster of IC 1805 and the brighter glow of the fish head I noticed a small open cluster of lovely golden stars magnitude 14-17. I later found out it was called Tombaugh 4, discovered by Clyde Tombaugh while reviewing photographic plates from Lowell Observatory.

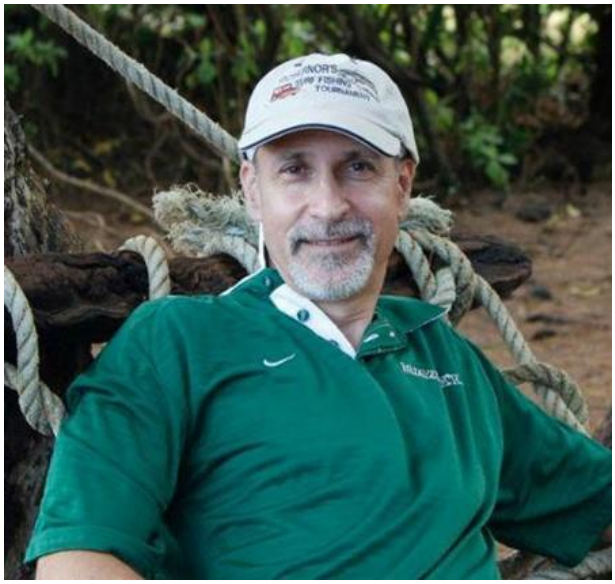
If I had more clear nights between the holidays I would have liked to try a wide-field shot with a camera lens in order to frame the whole nebula. I am still very happy with how the close up turned out. I look forward to getting more practice with the new camera.

IC 1805 Heart Nebula and IC 1795 Fish Head Nebula

208mm f/3.9 Newt, ASI294MC-Pro, SW Quattro CC,

8s x 243 = 2744s = ~46 min, live-stacked and stretched in SharpCap

James Dire: Observer from Illinois



The Heart Nebula, IC 1805, is part of a vast complex of nebulae located in the constellation Cassiopeia. The nebula is located five degrees southeast of the star Segin (ε Cas) and eight degrees east of the star Ruchbah (δ Cas). Segin and Ruchbah are the two easternmost stars making up Cassiopeia's "W" asterism.

The brightest part of the Heart Nebula is separately known as NGC 896. NGC 896 was discovered by William Herschel in 1787 using his 18.7-inch reflector. NGC 896 measures 27 × 13 arcminutes and is estimated to be magnitude 10.

The Heart Nebula itself extends about one degree in both right ascension and declination. The Heart Nebula lies 7500 light years away in the Perseus arm of the Milky Way Galaxy.

IC 1805 is also the designation of an open star cluster in the middle of the Heart Nebula. This cluster is also known as Melotte 15. This loose open cluster is estimated to be a mere 1.5 million years old and contains several bright stars 50 times the Sun's mass. These stars are responsible for exciting the hydrogen gas in the Heart Nebula resulting in the red glow as seen in photographs.

My image of IC 1805 was taken with a 71mm f/4.9 apochromatic refractor using an SBIG STF-8300C CCD Camera. The exposure was 140 minutes. In the image north is up and east to the left.

The second image has labels pointing out the location of NGC 896 and the central star cluster in IC 1805. Two more open clusters are labeled in the image. The first is NGC 1027 located on the east side of the heart. NGC 1027 is a bright rich cluster of approximately 50 stars all within a 20 arcminute circle. The cluster has a total magnitude of 6.7. The other cluster is

called Markarian 6 and is located southwest of the heart. Markarian 6 is magnitude 7.1 and is 6 arcminutes in diameter. All three star clusters contained in the nebula are worthy of inspection with any telescope at medium to high powers.

My best view of the Heart Nebula was with my 14-inch f/6 Dob using a 26mm eyepiece (82×). This combination provides a one-degree true field of view. While the view comes nowhere close to my image, it was possible to see many of the brighter regions of the nebula, especially NGC 896 and the three above-mentioned star clusters.

Sue French: Observer from New York

14×70 binoculars:
IC 1805 is a fairly large, loose open cluster of six to eight moderately bright stars, depending on the borders, plus about 15 more stars on the backdrop.

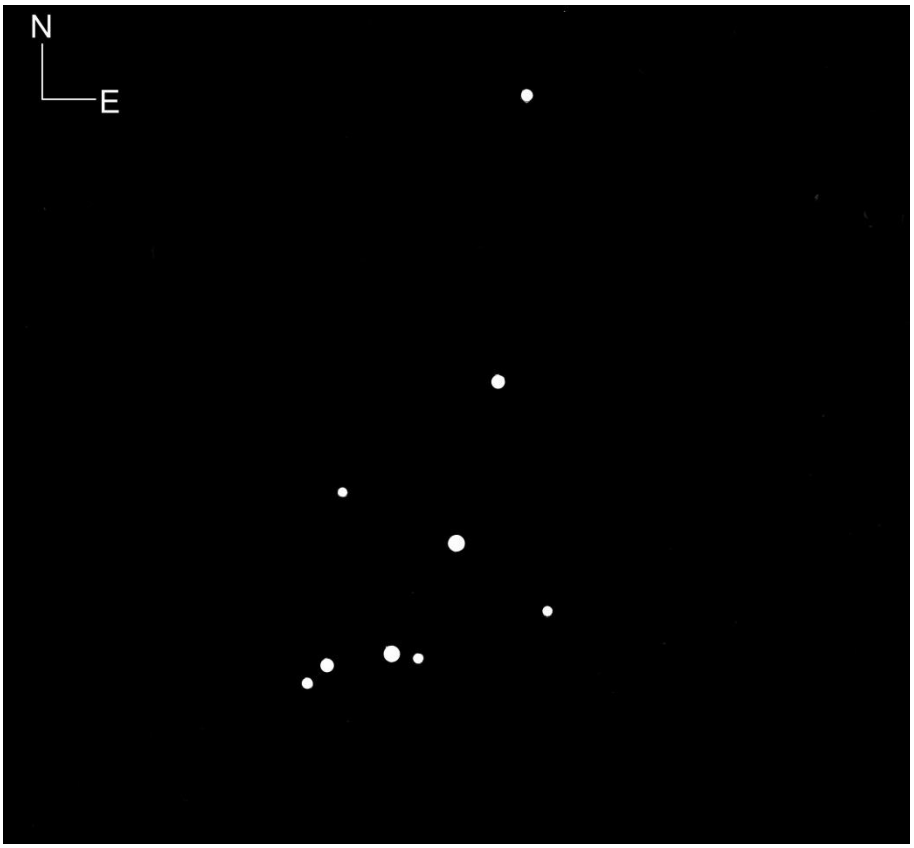
105/610mm (4.1-inch f/5.8) refractor

17×: Nebulosity is faintly visible without a filter, a little better with a UHC filter, and very nice with an O III filter. The brightest areas include: the IC 1805 cluster; a wide arc that runs between clusters IC 1805 and NGC 1027 and then loops around north of the IC 1805 cluster; and a small patch in the position of the nebula complex NGC 896/IC 1795. A fainter arc starts between the two clusters, loops around south of cluster IC 1805 and then northward on the western side of this cluster. Both loops are quite patchy with very uneven brightness. Nebulosity also stretches from cluster IC 1805 to the eastern loop.

87×: About 40 stars are visible in cluster IC 1805. Its brightest member is a double star, residing in a rough circlet of fainter suns at the cluster's heart. Arms of stars starting north and south of the circlet curve westward. Two fairly bright stars northeast form a faint star with the lucida. A broad scattering of stars straggle east through southeast from the circlet, while extremely faint specks of light can be seen within the circlet and rounding out the group. The double star is Stein 368 AB (STI 368 AB), PA 97º, separation 9.9″, component magnitudes 8.0 and 10.1. NGC 1027 displays about 50 stars centered on the group's central lucida. Starting north-northwest of the star, its brightest attendants spiral outward from it for about 1½ turns.

These observations were made in the northern Adirondack Mountains of New York, where my naked-eye limiting magnitude near Polaris was 6.3.

Since folks seem to like Markarian 6, here's a sketch I did with the 105-mm refractor at 87×.


N
E

Chris Elledge: Observer from Massachusetts

On November 30th @6:52pm EST, I used a 102mm f/7 refractor to observe IC 1805 from the ATMoB Clubhouse. Sky conditions were: Bortle Scale 6; NELM 5.0; Transparency: Above Average; Seeing: Poor.

I found IC 1805 in the Dobsonians by star hopping from Segin (ε Cas) and heading SE via a triangle of mag. 8 stars (HD 12623, HD 12819, and HD 12568) and a zigzag group of mag. 7 and 8 stars containing HD 13686. Several bright mag. 6 and 7 stars surround IC 1805, and the cluster's center is quite bright, so it's easy to tell when you've found it. The refactor I used for this observation was on a goto mount, so it felt a bit like cheating compared to my usual reflector observations.

At 20× (35mm, 3.4º FoV), the central cluster of IC 1805 is composed of 10 bright mag. 7 to 8 stars. There are two parallel North/South lines of 4 stars. There is a scattering of mag. 8 and 9 stars all around the outer edges of the nebula. There is a faint glow all throughout the center of the view, but the ESE and NNE sides are notably darker. Moving the view around makes it clear that the IC 1805 area is brighter than the surrounding areas. The extent of the nebulosity seems to end near a line of mag. 9 to 10 stars on the North side. It continues on the WNW side toward another cluster of stars that is in NGC 896. There is a faint rift between the nebulae in a NE to SW direction. The nebulosity's Southern bounds are at a WNW to ESE line of mag. 8 and 9 stars on the South side. The tiny cluster Markarian 6 sits right on the SW edge of the nebulosity. The brightest nebulosity is concentrated around the central cluster of stars.

Adding a UHC filter reveals some mottling in the nebulosity outside of the bright central nebulosity around the cluster. The ESE edge of the nebula appears brighter than the inner portions. A faint finger of glow stretches to the NE from the Eastern edge of the nebula. Replacing the UHC with a Hydrogen-Beta filter darkened the stars and the brightest central

nebulosity, but the edges of the nebula stand out more with some visible mottling inside the two lobes of the heart shape.

Below are the observing hints that I wrote up for others attempting this based on observing through several telescopes:

I spent the night of November 30th observing IC 1805 through a variety of telescopes with various filters at the ATMoB Clubhouse. The best view that I got was through a 102mm f/7 refractor with a 35mm eyepiece providing a 20× magnification and 3.4º FoV. I recommend using a UHC to see the most nebulosity. While it was still difficult to determine exactly where the edges of the nebula stopped, it was clear that areas around the nebula were darker than the area inside.

I actually found a Hydrogen Beta filter to be useful on this object. In my refractor with the Explore Scientific H-beta filter (on the wide side for bandwidth) I was able to observe that the outer edge of the nebula was slightly brighter than parts of the middle. Some mottling was visible within the nebula outside of the brighter star clusters. This filter makes everything else really faint.

I was able to observe the nebulosity in both my 10″ f/5 Dob (36x, 1.9º) and the ATMoB 25-inch f/3.5 Dob (63x, 1.1˚). In both cases it required extensive panning of the view to determine that the field was brighter within the nebula than outside. It was difficult in both cases to determine exactly where the edge of the nebula was. Setting the view on the edges of the nebula, I could tell that one side of the view was brighter than the other. Filters helped, but the view through the 20× power of the 102mm refractor was better.

Conclusions:

Low magnification definitely is important to this one. Probably works best with the biggest aperture you can find that still gives 20x or lower magnification at a reasonable exit pupil. I don’t think anything over 5-inches will improve visibility. Don’t bother with OIII unless you want to just see the nebulosity around the bright clusters. UHC is ideal. H-beta is fun if you happen to have one that fits your lowest power eyepieces already.

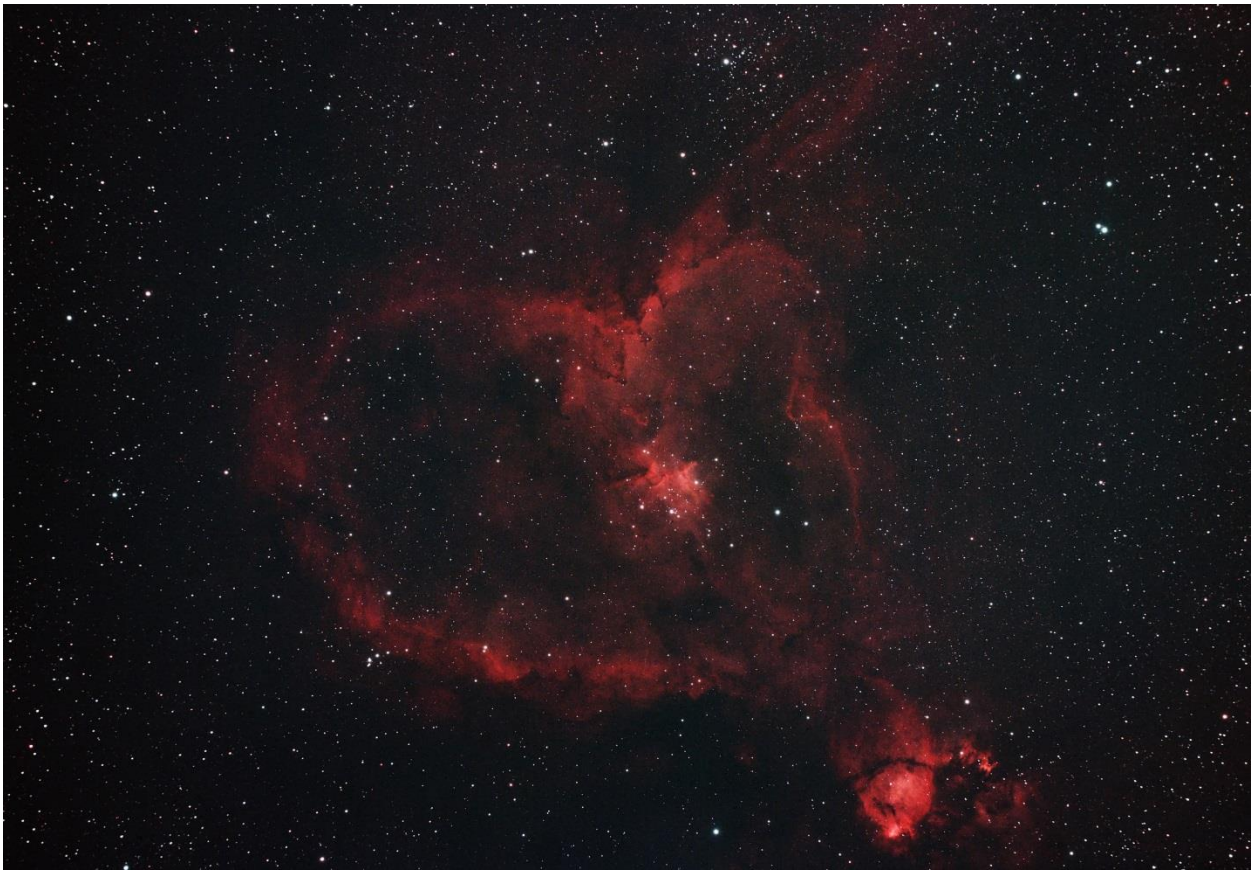
Sameer S. Bharadwaj: Observer from Massachusetts

Pursued the Heart Nebula all summer with an unmodified camera with limited success. This is the object that finally motivated me to get the camera modified.

William Optics GT71 w/ 0.8× flattener

Optolong L-enhance filter, Canon EOS 77D modified

12 x 360 seconds, Ioptron zeq25 guided with QHY5L2M



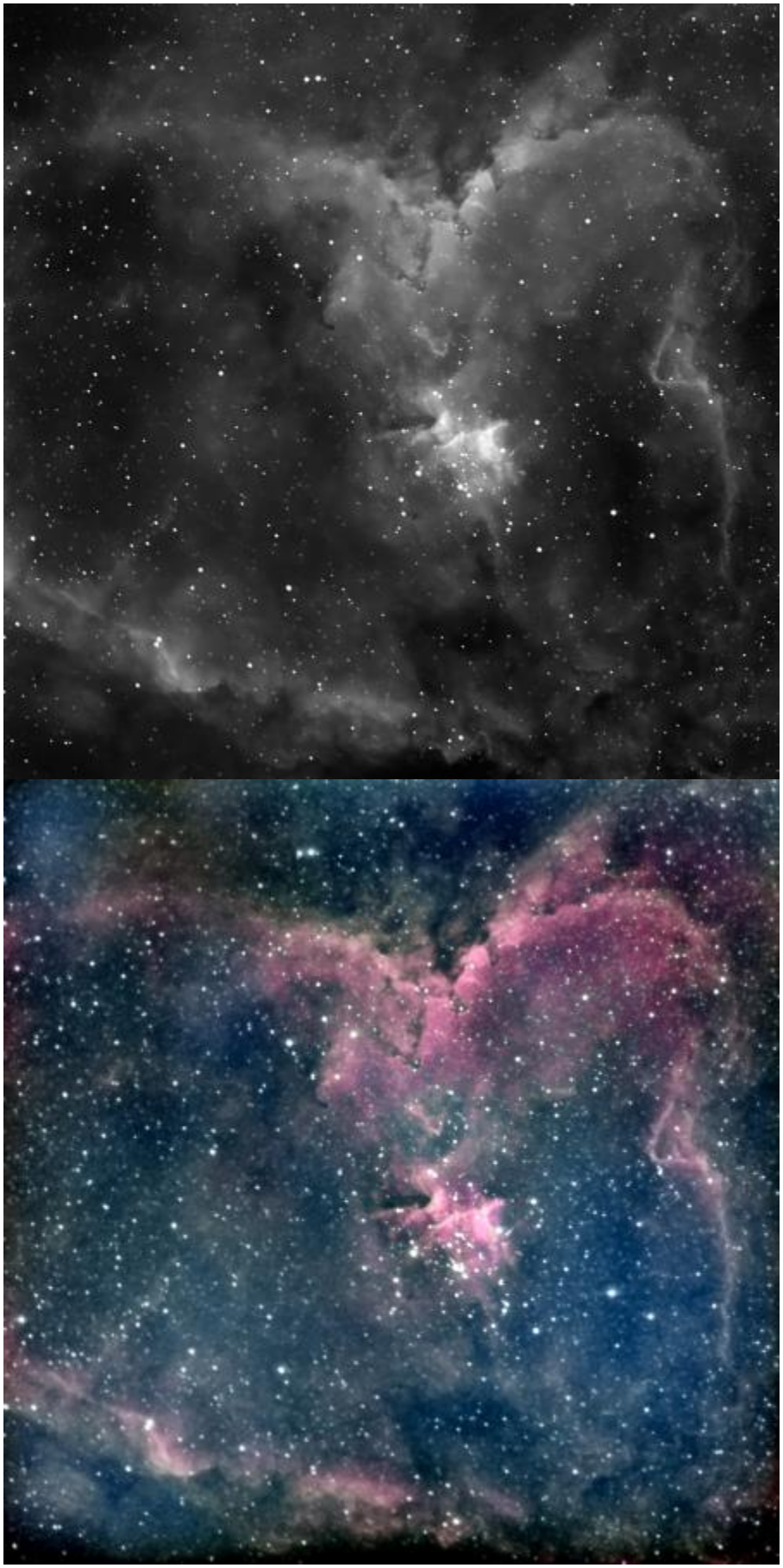
Mario Motta: Observer from Massachusetts

B&W image of IC 1805: An H-alpha image taken through my 6-inch refactor in 2015 for wide field. And has 7, 20 min subs, so 2 hours 20 min of H-alpha.

Color Image: This was combined with 1 hour each of Oxygen-2 filter and Sulfur filter.

IC 1805 (the Heart Nebula), North is to the right on this image, rotated to show the "heart" shape more readily.

Of course…to a cardiologist the Right heart (on the left, person facing you), is very "enlarged" so this is a rather sick heart, with what I would call right heart failure.



Roger Ivester: Observer from North Carolina

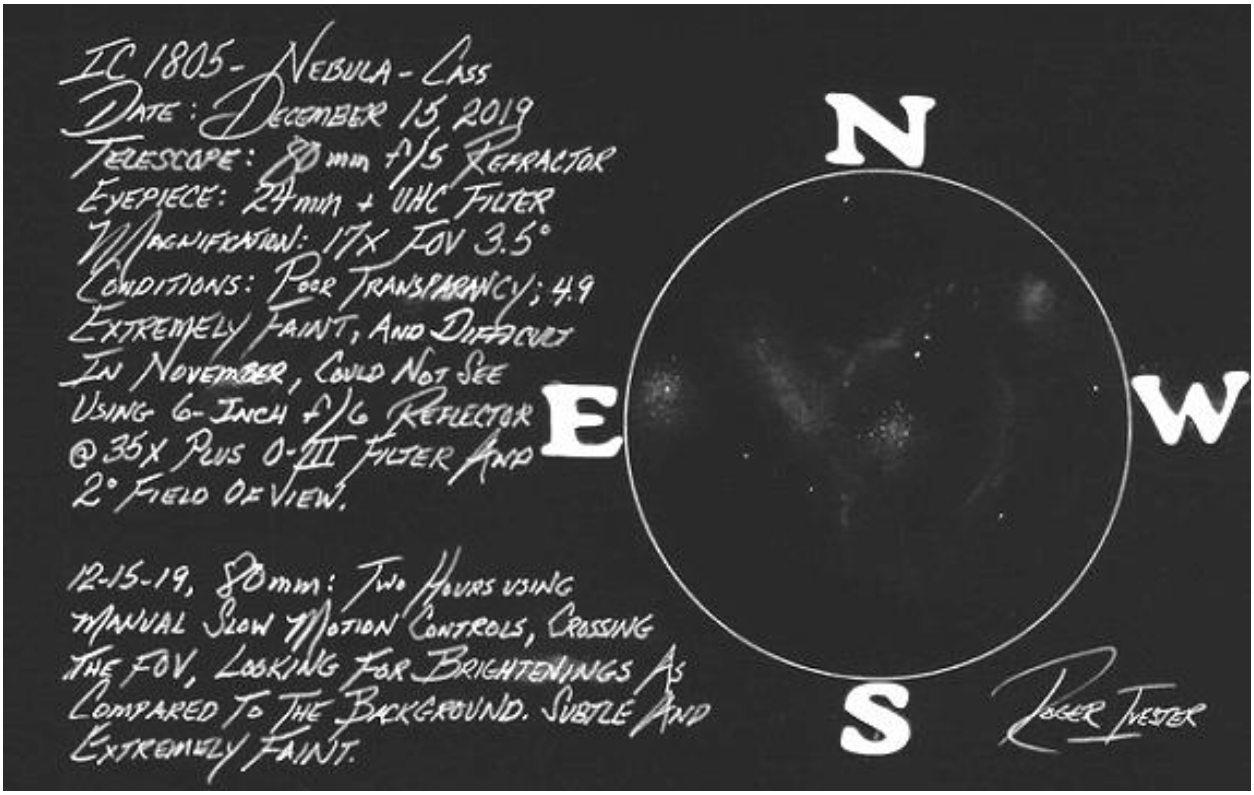
In November I used a 6-inch f/6 reflector in an attempt to see the nebula in IC 1805. My eyepiece of choice for this night was a 2-inch-barrel 26mm with an O III filter. This gave me a field of view of 2º.

Scanning the area before using the O III filter, I first saw open cluster NGC 1027. A bright cluster at magnitude 6.7, consisting of about 20 stars with one brighter member located in the center. This cluster is located just to the east of IC 1805.

Now to IC 1805: I could easily see the cluster of stars located in the central region of the IC 1805 nebula. When adding an O III filter, I scanned the area for more than an hour; however, I cannot say definitively that I could see any nebulosity.

On December 15, 2019, I used an 80mm f/5 refractor, with a 24mm eyepiece and a UHC filter. I was a bit dubious before beginning my observation that I'd be able to see the IC 1805 nebula based on my results using a 6-inch reflector only a month earlier, and with similar sky conditions.

After about thirty minutes, I could not see any of the nebula, but the central stars were easy and bright. However, when I began using my "manual" slow-motion controls, I began scanning across the IC 1805 area, and to my surprise, I began seeing very faint brightenings in the area. I scanned one section at a time, and was able to sketch extremely faint tentacles and fingers of nebulosity, only marginally brighter than the background. After well over two hours of "slow-motion" scans, well over two hundred crossings, I was able to sketch some of the brighter sections, encircling the central cluster.



Telescope: 80mm f/5 achromatic refractor
Eyepiece: 24mm + UHC filter
Sketch Magnification: 17×
Field of View: ~3.5º
Conditions: Poor transparency, NELM ~4.9