

Observers' Forum

Simeis 147 – another supernova remnant in Taurus

Asked to name supernova remnants in Taurus, a lot of amateurs would probably be stuck after the Crab Nebula. In fact not far away from the Crab is the huge but very faint remnant Simeis 147. Discovered in 1952 by G. A. Shain & V. E. Hase at the Crimean Astrophysical Observatory at Simeis in the former USSR using a 25-inch (635mm) Schmidt camera, it was numbered 147 in their list. The nebula was also catalogued by Stewart Sharpless, an astronomer at the United States Naval Observatory in Flagstaff, Arizona who examined the Palomar Observatory Sky Survey plates (POSS) for HII regions. His second and final catalogue of 313 objects was published in 1959 and Simeis 147 appears in his list as Sh2-240, which is the preferred designation in most charting software. The remnant can be found at RA 05h 39m and Dec +28° (2000.0) and is thought to lie at a distance of around 3,000 light years with a diameter of 150 light years. At the heart of

this intricate mass of twisted strands of nebulosity lies a pulsar, catalogued as PSR J0538+281 – all that remains of the star that exploded some 60,000 years ago.

Until recently Simeis 147 was an extremely challenging target for both imagers and visual observers and while still a very difficult visual object, modern filters and CCDs have made it an achievable, but still somewhat challenging object for the photographer. And, with a diameter of 200



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arcmin (over 6 times the diameter of the full Moon), wide field instruments will be needed if the nebula is to be captured without stitching individual frames together. The photograph shown here, the only one received so far by the Section, was taken by Bob Winter from rural Wales during 2010 January. It was made using a Takahashi FS60C refractor with 0.72 focal reducer and QSI 583 CCD camera. Exposure time was 90min through an H-alpha filter.

Visual observers should not expect to see the remnant in its entirety and the most that can be expected is to glimpse some of the brighter areas. These lie to the south of the nebula although some observers also see a brighter, and the word is very relative here, spot on the northern edge. It goes without saying that extremely transparent skies will be needed and probably a telescope in the 50cm-plus class with an OIII filter. The centre of Simeis 147 lies about 3.5° ESE of β Tauri (Al Nath), the star forming the top of the bull's upper horn. Probably the best approach for the visual observer is to hop to this region and then slowly scan methodically around the area. If you suspect an area of nebulosity sketch its position against the star field so you can compare it to a star chart.

US amateur Rich Jakiel has posted his sketch of the nebulous areas, along with a comparison chart and photograph, on the Adventures in Deep Space web site, see <http://astronomy-mall.com/Adventures.In.Deep.Space/s147>.

Simeis 147 is one of the most challenging deep sky targets. If you fail to see or image it you can always console yourself by observing the Crab Nebula a few degrees away.

Observations of NGC 40

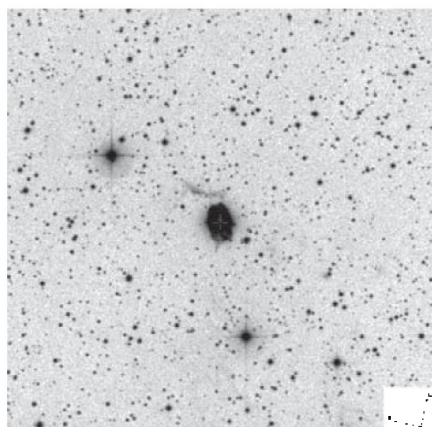
In the 2010 August Journal 'Observers' Forum' (120(4), 245) the planetary nebula NGC 40 was discussed. Following on from this Owen Brazell has commented:

NGC 40 is one of the more interesting of the brighter planetary nebulae in the sky. Unlike most other such nebulae this object does not respond well to the use of an OIII filter because there is very little OIII emission. Normally the OIII emission comes from collisionally excited lines of oxygen and the reasons for no OIII emission in this case could be either a low temperature central star that is not emitting enough high energy photons to excite the nebula, or a high density nebula where the energy levels that produce the OIII lines are getting collisionally de-excited before they have a chance to emit the

photons, a process called damping. In the case of NGC 40 the central star is a high temperature object with a spectral type of WC 8, so it is likely that this is a high density object.

My main interest here though is not in the planetary nebula itself but in the strange loop of gas seen in the image just above it. Whilst observing with my 20-inch (50cm) F5 Dobsonian and DGM NPB filter (similar to a UHC filter) and a 10mm Tele Vue Ethos eyepiece, which gives a magnification of $\times 250$, I saw this structure with averted vision. It was sufficiently obvious that I have little doubt about the observation, especially as it was a blind observation – that is I did not know it was there when I was looking at the nebula, and its position in relation to the two brighter stars was correct. I have not seen any other observations of this halo and despite checking with two other respected observers I can get no other confirmation of the visibility of this nebula. I would be interested to hear if any other observers have seen it. Unfortunately the observation was made this summer at the Salisbury Star Party (SSP) and was too late for the Observers' Forum article in the August Journal.

The attached image is the blue plate from the DSS as the nebula hardly shows up on the red plates at all. I used the *Aladin* server from CDS to create the image.



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