Special Project for The Cosmos: A Survey of Modern Astronomy, Spring 2021,
Prof. Brian Hill

By Alice Owen and Declan Rexer

Choice of Object: A supernova remnant in the constellation Cygnus, The Western Veil Nebula

Originally, we hoped to retrace the steps of the great Galileo Galilei in his discovery of the four moons of Jupiter. After some torturously late (early!) nights and encountering unforeseen difficulties in that endeavor, we changed our drift, instead looking further afield into the depths of the Milky Way Galaxy. We wanted to photograph a supernova remnant because we think they are the most beautiful thing one can encounter in the heavens.

The Veil Nebula is a remnant from a supernova which occurred between 10,000 and 20,000 years ago. It lies 2400 light years away from earth. We photographed the western portion, which is the most photogenic.

We used three filters to capture three different bands emitted by the supernova remnant. The CBB (clear blue blocker) filter allowed us to capture and enhance visible white light. The Hydrogen Alpha filter allowed us to see the great abundance of Ha, which we represented in red. The Oxygen filter allowed us to see Oiii, which we represented in teal.

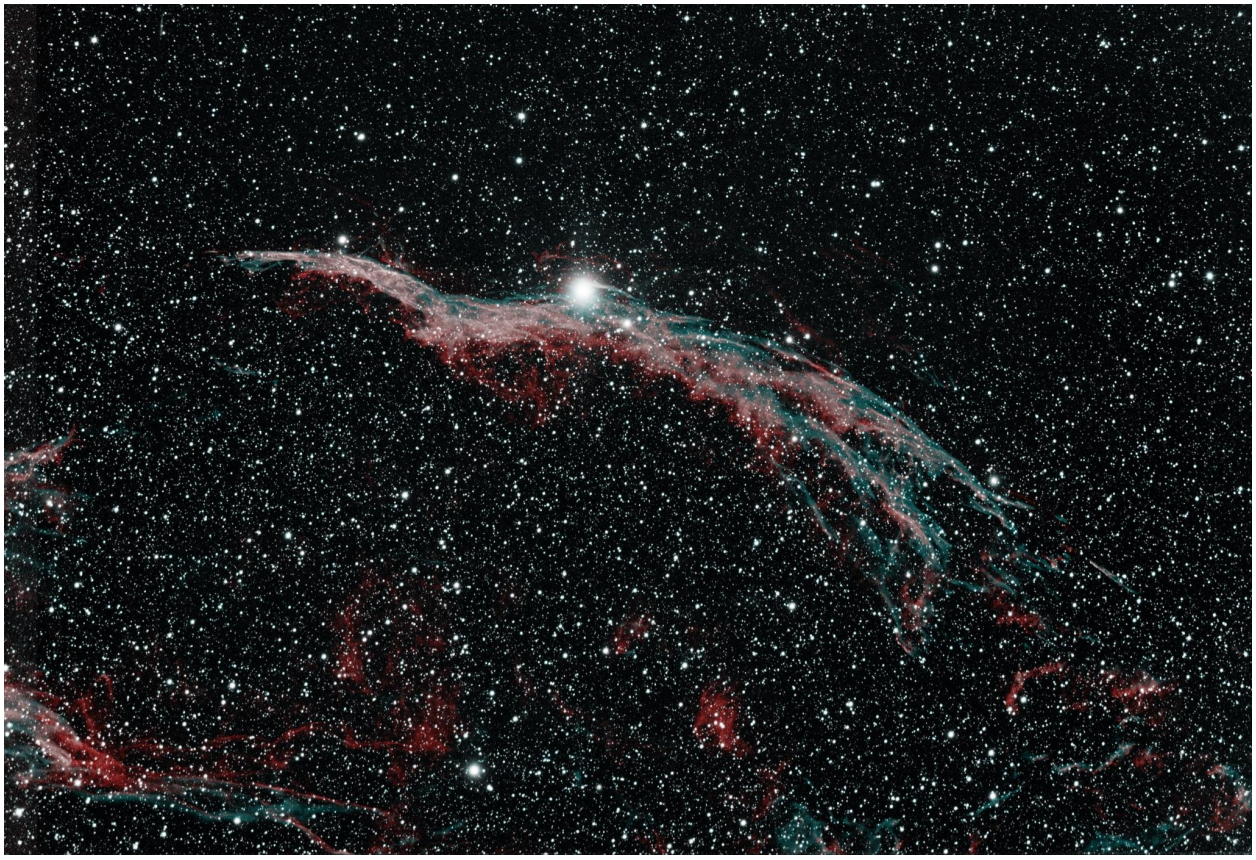
We used 20 ten-second exposures to capture the white channel and 20 two-minute exposures each for Ha and Oiii.

To process the images, the software first scanned each image for satellites and atmospheric distortion. Then we stacked each set of viable images, and proceeded to ‘stretch’ them, making it such that faintly bright pixels became blindingly white.

Our result: the beautiful image below, from which one can ascertain that there is plentiful Oiii and Ha in the Veil Nebula (or at least there was 2,400 years ago, the time in which it took for the light we see to travel from the Nebula to Earth).

One interesting concluding note: though this nova remnant is incredibly difficult to see today (requiring a high powered telescope operating with a long exposure capture), this was not the case when the light of the supernova explosion first reached Earth. Humans witnessing the supernova explosion itself would not only have been able to see it with their bare eyes, the explosion would have been so bright that they would even have been able to see it in the daytime.

The Western Veil Nebula



The original high-resolution version of this image is posted here:

https://brianhill.github.io/astronomy/projects/VeilNebula.html