

A colorful take on northern skies

Although this British amateur was a bit late to astroimaging, his dedication and superb equipment have moved him into the hobby's upper echelon. text and images by Gordon Haynes

The Heart Nebula (IC 1805, right) teams up with the Baby Nebula (IC 1848) in the constellation Cassiopeia the Queen in this two-panel mosaic. (All images: Tele Vue NP127/FLI astrograph system using an FLI PL16803 CCD camera; this image: H α /OIII/SII image with exposures of 200, 220, and 240 minutes, respectively, per panel)

You could say that I had an early start to astronomy. The night sky began to intrigue me when I was 5 years old. Luckily, at the time my family lived in a non-light-polluted area, so the sky was beautiful to look at with the naked eye.

Still, the one thing that really amazed me was a black-and-white picture of the Andromeda Galaxy (M31) in an old edition of *The Guinness Book of World Records*. The reference listed it at the time

Gordon Haynes continues to image celestial objects from his home in Hereford, England.

as the most distant object visible with the naked eye. At that age, I didn't know why I couldn't see it like that. Obviously, back then I had no understanding about long-exposure photography.

First steps

When I was 13, my parents bought me a 2-inch refractor, which had a push-pull focuser and a ball-pivot table tripod. It was fine for observing the Moon, but everything else was disappointing. Still, it increased my interest.

In 1979, when I got my first job as a psychiatric nurse, I bought a "proper

telescope": a 4.5-inch *f*/10 reflector on a wooden tripod with a manual equatorial mount. This scope was a huge improvement, and at the time I had plans to take images because I also dabbled in photography. But I didn't pursue it as astronomy took a back seat for a few years while I competed in running and cycling races, which took up a lot of time. In hindsight, this was a blessing in disguise because the scope had vibration problems and no motor, so it wasn't good for imaging.

In 2004, I was done competing in sports and had reached my mid-40s. I had gone into town, seen some space-related

magazines, and picked up a selection (including *Astronomy*). As I read them, seeing some of the images produced by amateurs and professionals rekindled my interest. So, after doing a bit of research, I decided to take the plunge and get a full system suitable for observing and imaging. At the time, the digital era had begun, making imaging a lot easier than in the days of film. I bought a 10-inch Meade LX200GPS Schmidt-Cassegrain telescope and a DSI camera.

My first attempts at imaging were hit and miss (more miss than hit) because I wasn't using guiding and there were some

software conflicts between the DSI and my laptop that caused the computer to lock up if I tried exposures longer than 15 seconds. I was bitten by the bug, however, and felt pleased that I managed to record anything at all. (You can view all of these early attempts on my website at www.imagingtheheavens.co.uk.)

Imaging fever

I wanted to delve deeper into imaging, but I needed to buy better equipment. To fund the purchase, I sold my well-used Meade as well as a high-end hi-fi system and record collection that I wasn't using

due to time and space. I decided on a Paramount ME mount and a Pier Tech Tri-Pier tripod with custom "wheelie bars." They allowed me to move the system in and out of a shed I had built.

I also bought a 14-inch Celestron C14 Schmidt-Cassegrain telescope, a 2.4-inch William Optics Zenithstar 60 refractor, and a Starlight Xpress M8C CCD camera. I mostly imaged through the small scope because I was becoming more interested in large deep-sky objects. I used the C14 to observe the planets.

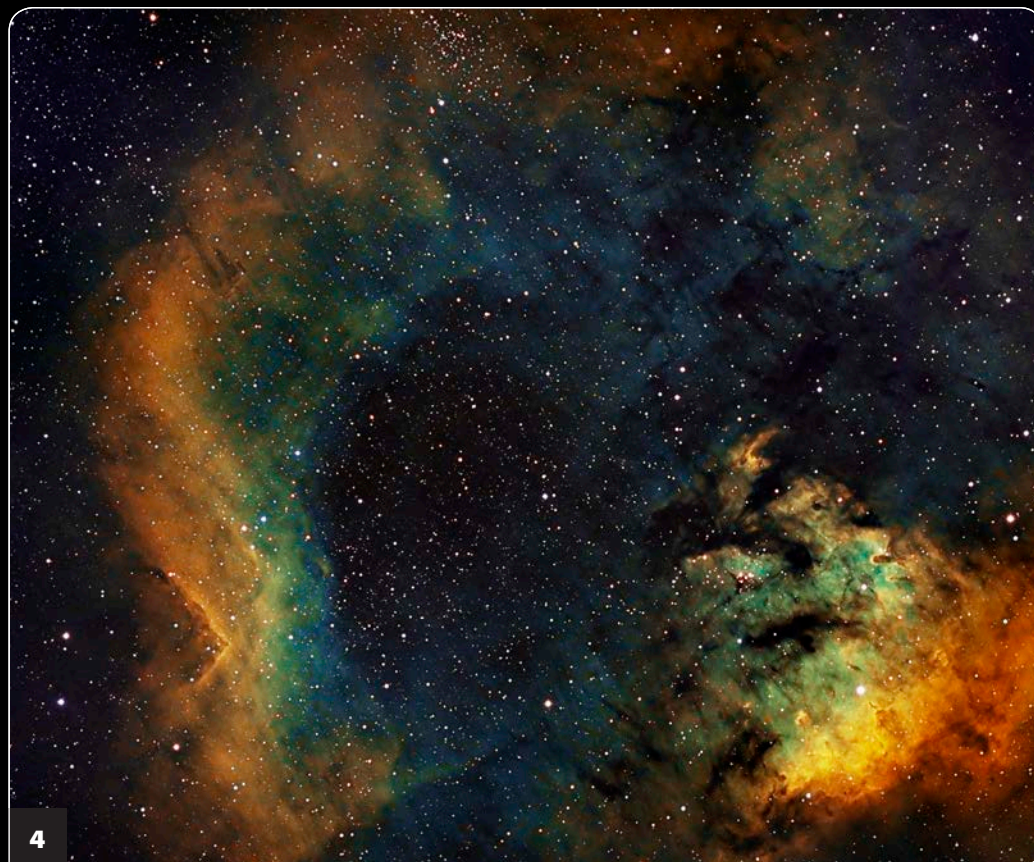
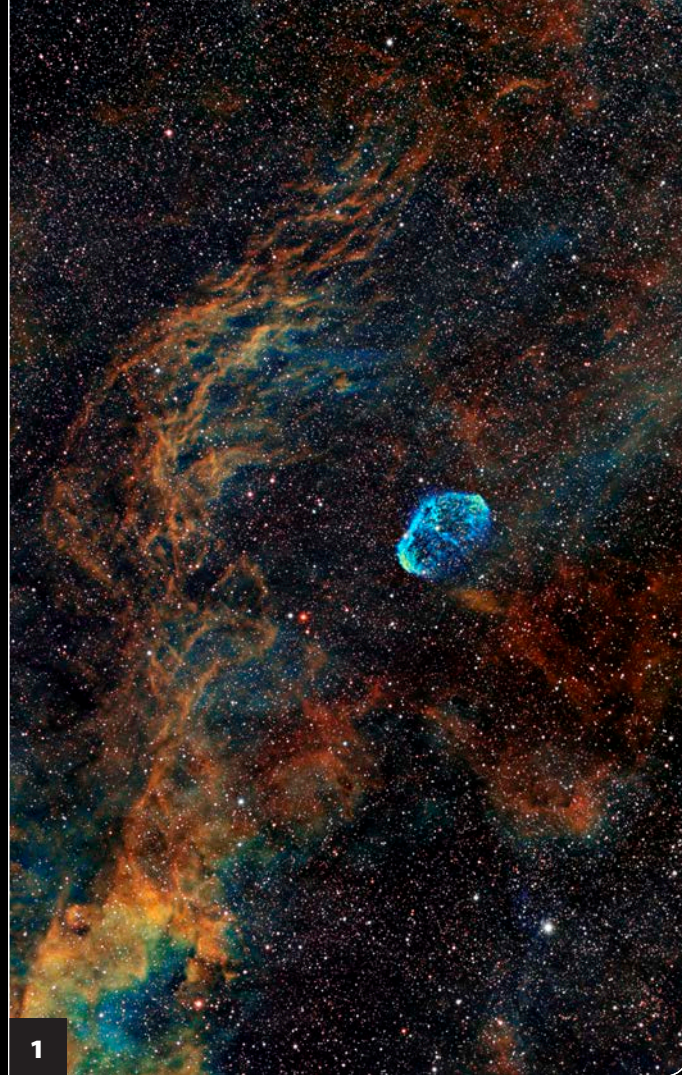
Because I don't drive, I would do all of my imaging from my back garden, which is about 20 yards from a busy road in Hereford. The location suffers from a mixture of artificial light from street lights, house lights, and neighbor security lights coming on periodically during the night, not to mention the outdoor lights at a tennis club 200 yards down the road. I quickly came to the conclusion that I couldn't do anything about the light pollution, so I've had to work around it.

Upgrading again

After a couple of years, I sold the C14 and bought an APM Telescopes 4.5-inch TMB 115 *f*/7 refractor, a Starlight Xpress H36 CCD camera, and a Finger Lakes Instrumentation filter wheel with LRGB and narrowband filters. Light pollution made it hard to image in LRGB, so I did some research and discovered narrowband imaging, which was a godsend because I could image on any clear night.

Simply put, narrowband imaging happens when you shoot through filters that transmit only a small (narrow) part of the light striking them. The three most popular filters are Hydrogen-alpha, Oxygen-III, and Sulfur-II. When you process the data you collected through the filters, you assign each to a "normal" color channel — red, green, and blue — and then combine them to create your final image.

When I changed to primarily narrowband work, I again changed equipment. I bought a 10-inch Takahashi BRC-250 Baker-Ritchey-Chrétien reflector, and the TMB made way for a 4-inch Takahashi FSQ-106ED. At this time, my partner, Joanna, bought me a Starlight Xpress Lodestar guiding camera for Christmas, and this made a huge improvement to the quality of my images. Prior to using this camera, all my images were combinations of 10-minute unguided exposures.



1. The Crescent Nebula (NGC 6888, center) formed when fast-moving winds from an energetic star collided with slower-moving material ejected previously. This region of the constellation Cygnus contains vast swaths of emission nebulae, as this image shows. (H α /OIII/SII image with exposures of 200, 240, and 260 minutes, respectively)

2. The Jellyfish Nebula (IC 443, lower left) is a supernova remnant in the constellation Gemini the Twins. It covers as much sky as three Full Moons. (H α /OIII/SII image with exposures of 240, 260, and 220 minutes, respectively)

3. This region of Sharpless 2-157 is a combination of emission nebulae and star clusters set against a dense stellar backdrop. (H α /OIII/SII image with exposures of 240, 300, and 300 minutes, respectively)

4. Cederblad 214 is the emission nebula surrounding the young star-forming region NGC 7822 in the constellation Cepheus. (H α /OIII/SII image with exposures of 180, 160, and 240 minutes, respectively)



The Pleiades (M45) is the sky's brightest star cluster. Once a separate constellation, M45 is now part of Taurus the Bull. (LRGB image with exposures of 200, 120, 120, and 120 minutes, respectively)



The author also collects data through RGB filters, as these images of the Andromeda Galaxy (M31, above) and the Pleiades (M45, left) demonstrate. (M31 is an H α LRGB image with exposures of 240, 260, 120, 80, and 110 minutes, respectively)

I sold the BRC-250 because of its size and changed from the Starlight Xpress cameras to FLI PL16803 and ML8300 models. By then, 90 percent of my imaging was narrowband and still is.

Chance encounter

Last year, while I was helping out at Astrofest in London, David Nagler from Tele Vue Optics asked if I would be willing to test a prototype imaging system. It consisted of Tele Vue's 5-inch NP127 refractor teamed with a Finger Lakes Instrumentation ProLine PL16803 CCD

camera, Atlas focuser, CenterLine filter wheel, and the Zero Tilt Adapter system.

Because I already owned the camera and the focuser, it seemed like a good idea, so I agreed. I have been using this system for the past year, giving feedback to Tele Vue. The good news is that it now has a permanent place on my Paramount.

The only item I added was an Officina Stellare Falco guide scope. I control everything via USB and a laptop in my shed. The software that I use has remained unchanged, apart from upgrades. I use Maxim DL, RegiStar, and Photoshop, with

Gradient Xterminator, Hasta La Vista Green, and Noel Carboni's Astronomy Tools as plugins.

Final thoughts

I would describe my progress up the ladder of astroimaging as slow and steady, getting tips and advice from forums, friends that I've made along the way, magazine articles, and social networking. I'm still learning and don't think I will ever stop, although I am happy with my workflow and results — for now!

My imaging philosophy is to get as much quality data as possible and keep the processing simple. Earlier this year, I presented a talk at the NorthEast Astronomy Imaging Conference in New York. I described a simple-to-follow processing workflow for narrowband imaging that had only seven stages (of which two are optional). This was the highlight of my year, and I had a great time.

Some people ask me why I don't operate my system remotely from my house. The thing is, I like to sit out in the fresh air watching a movie on my tablet or doing a crossword. I've always preferred the hands-on approach. In the winter months, I have a down suit to protect me from the cold so I can image in comfort.

My plans for the future include getting a smaller chip camera to complement the PL16803 but using the same imaging platform. As to how well I've done, now you can judge the results for yourself. ☺

THE AUTHOR'S IMAGING SYSTEM

The Tele Vue NP127/FLI astrograph I now use is a joint venture between Tele Vue Optics and Finger Lakes Instrumentation. Both companies' philosophy was to produce an all-in-one imaging system that is easy to set up, requires no adjustments, and is stable in operation. It consists of a 5-inch Tele Vue NP127 refractor whose mechanical focuser has been replaced by a custom extension tube with a custom-made field flattener, which also has tilt adjustments.

This connects to FLI's Atlas focuser, CenterLine filter wheel, and ProLine PL16803 CCD camera. The system will work with any ProLine camera as long as the chip is no bigger than the one in the 16803. FLI's Zero Tilt Adapter, which provides a solid connection between all the components, holds the system together.

I simply put the system together and put it on my mount. Focus occurs when the Atlas focuser is approximately halfway through its travel.

I have been using the system for more than a year with no alterations necessary. I have needed no focusing adjustments due to temperature changes even when I transported the system to London and back for display at a show. It is truly "plug and play." — G. H.



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