

## Wolf-Rayet Shells - Chart Addendum

### Wolf-Rayet Shell Amateur Observations:

Most Wolf-Rayet Shells that we can visually observe are located within the spiral arms of our own home galaxy, and can be found all along the glowing band of light that we call the "Milky-Way". There's also a number visible in our nearby Magellanic Cloud satellite galaxies. Currently, there are about 44 known observable Wolf-Rayet Shell nebulas, but only 12 are observationally accessible from mid-northern +40 latitudes. (More WR Shells are visible from regions closer to the Equator or in the Southern Hemisphere).

Of the 12 shells telescopically available to us northerners, the majority, 7, are observable during the summer season, with 3 more visible during the fall season and the last 2 visible during the winter season. (There are no WR Shells visible for us northern hemisphere observers during the spring season).

Here are my EAA observations using an 8" SCT optical tube at f6.3 on an Atlas Gem mount with an ASI294MC camera & L-eNhanse narrowband filter. All 12 objects can be found on my website: <http://stellar-journeys.org/wolfrayettour.htm>

### **Wolf-Rayet Shells:**

#### **Summer:**

NGC6357	SH2-11	- "Lobster Nebula",	star=HD157504	(WR93)	located in Scorpius
G2.4+1.4			star=V3893 Sgr	(WR102)	located in Sagittarius
SH2-80	M1-67	- "Merrills Star",	star=QR Sge	(WR124)	located in Sagitta
WR128			star=HD187282		located in Sagitta
NGC6888	SH2-105	- "Crescent Nebula",	star=HD192163	(WR136)	located in Cygnus
WR134			star=HD191765		located in Cygnus
SH2-92			star=HD157451	(WR127)	located in Cygnus

#### **Fall:**

SH2-157		- "Lobster Claw Nebula",	star=HD219460	(WR157)	located in Cass/Cepheus
NGC7635	SH2-162	- "Bubble Nebula",	star=SAO20575	(BD+60°2522)	located in Cassiopeia
SH2-132			star=HD211564	(WR152) and	HD211853 (WR153)
					located in Cepheus

#### **Winter:**

NGC2359	SH2-298	- "Thor's Helmet",		(WR7)	located in Canis Major
SH2-308			star=HD50896	(WR6)	located in Canis Major

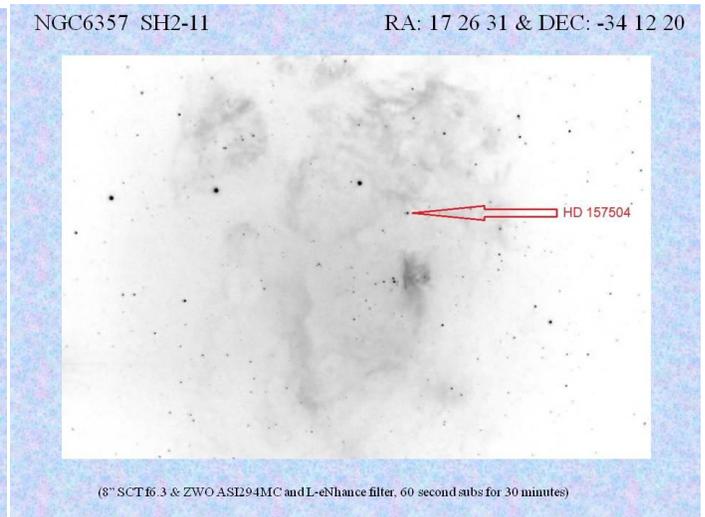
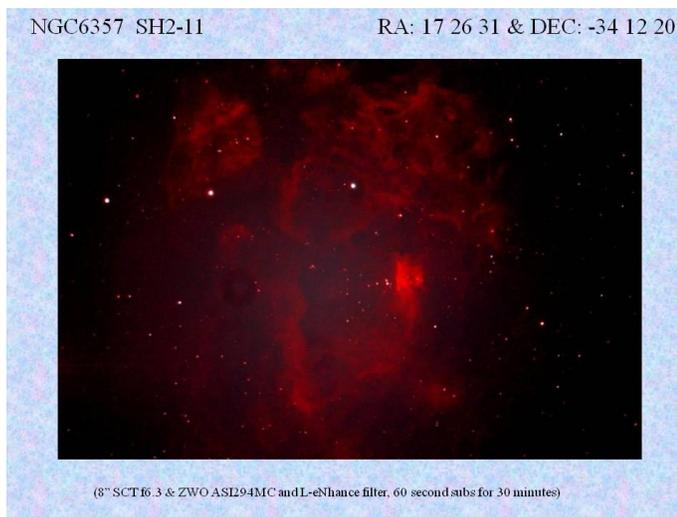
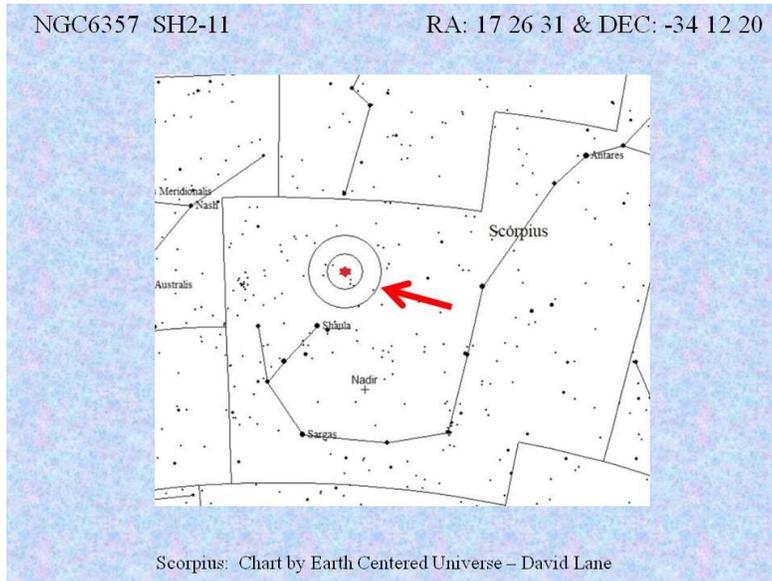
=====

**Summer:**

**NGC6357 SH2-11 WR93** “Lobster Nebula” located in Scorpius above and in a straight line from the ‘Stinger’ star Shaula, At RA: 17 26 31 DEC: -34 12 20

This Wolf-Rayet shell is a large area of irregular shaped faint H-alpha nebosity that fills the FOV and does well with narrowband filters. The bright off-centered central section of the nebula, surrounding the small +11<sup>th</sup> mag open cluster Pismis24, should be visible in medium size telescopes, with larger sized scopes showing more of the fainter outer swirls. In addition to several “O” stars from the Pismis24 cluster, the WR star illuminating the shell is HD157504 (WR93), at a distance of ~5,500 light-years. (livestacked using Sharpcap).

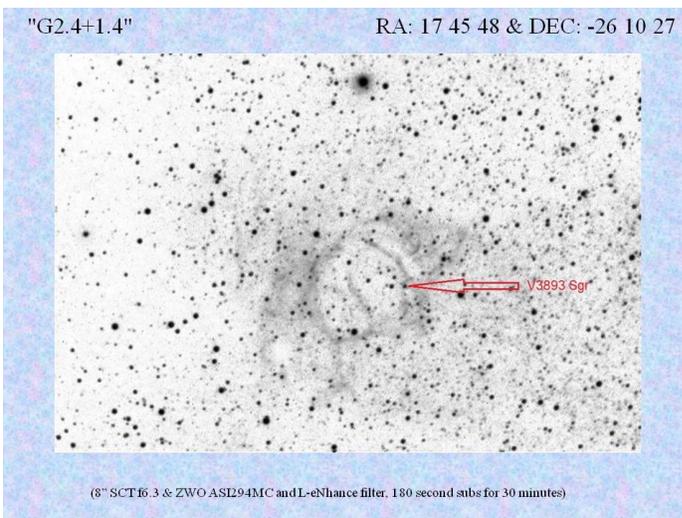
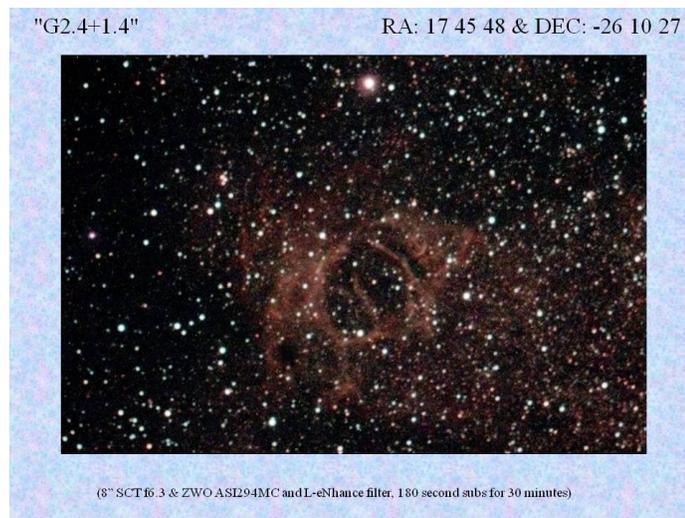
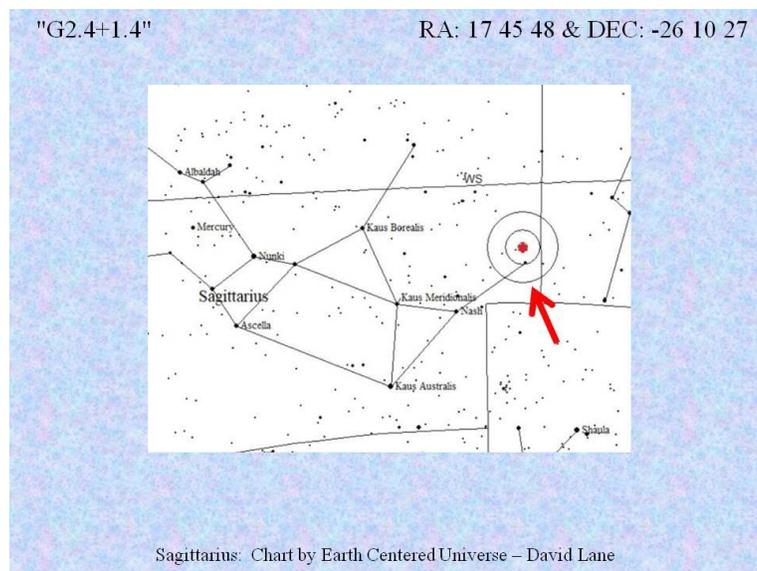
8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhance filter @ 60 seconds livestacked for 30 minutes.



**"G2.4+1.4" WR102** – located in Sagittarius, off the spout of the Teapot, in a very rich star-field, at RA: 17 45 48 DEC: -26 10 27

Both visually in large telescopes and in EAA images, the shell displays a faint filamentary ring shape with an interesting streak bisecting the center. The wind-blown bubble somewhat resembles a much smaller version of the Rosette Nebula. The +14<sup>th</sup> mag WR star, V3893 Sgr, lies far off-centered of the shell, embedded within one of the filament arcs. WR102 is thought to be at the last stage of its nuclear fusion lifecycle and may go supernova within the next 1,500 years, and has the potential of emitting a gamma-ray burst. Both star and shell are about 9,500 light years distant.

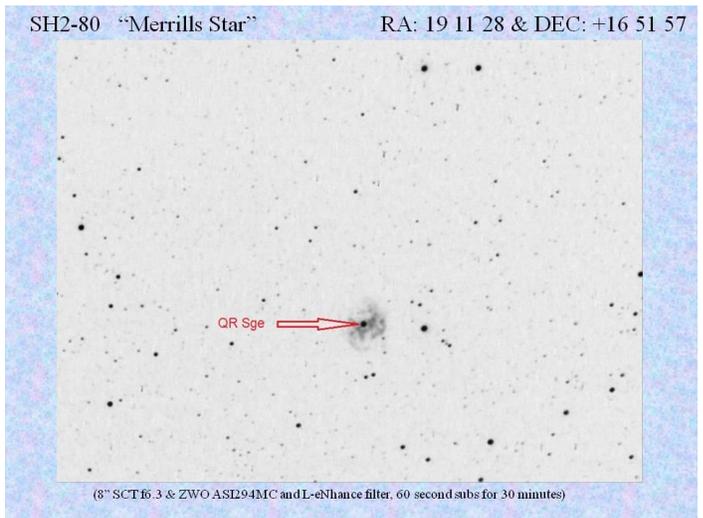
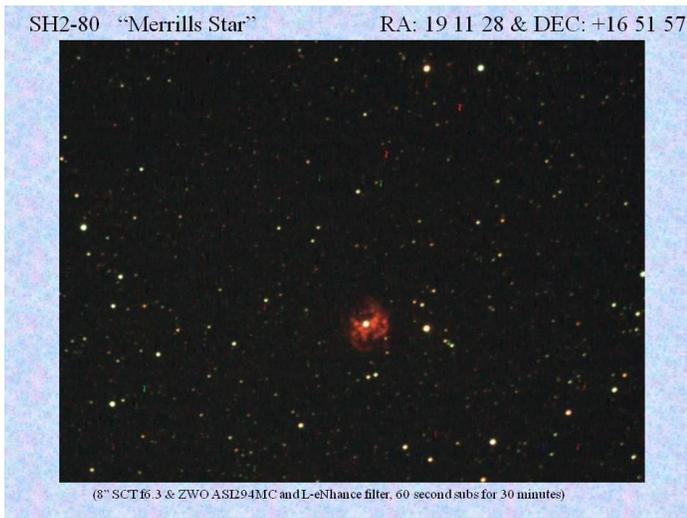
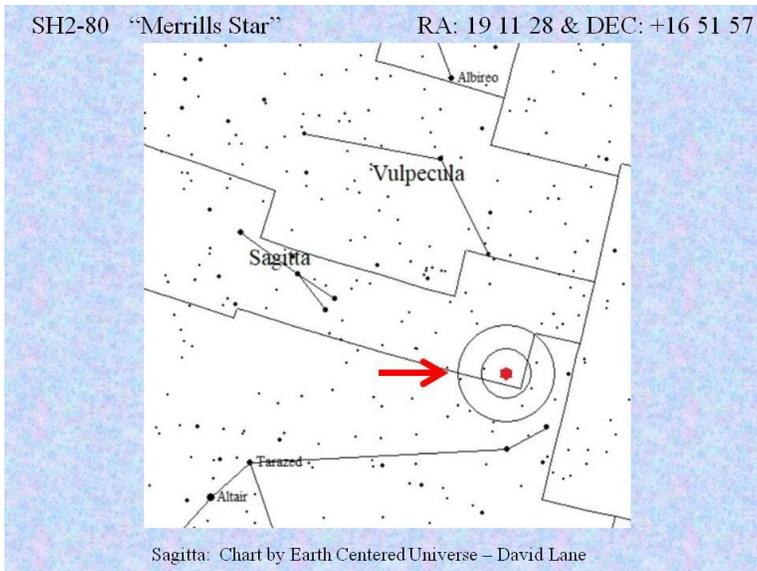
8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanche filter @ 180 seconds livestacked for 30 minutes.



**SH2-80 M1-67 WR124** – “Merrills Star”, located in Sagitta at its far western edge near the border with Aquila, at RA: 19 11 28 DEC: +16 51 57

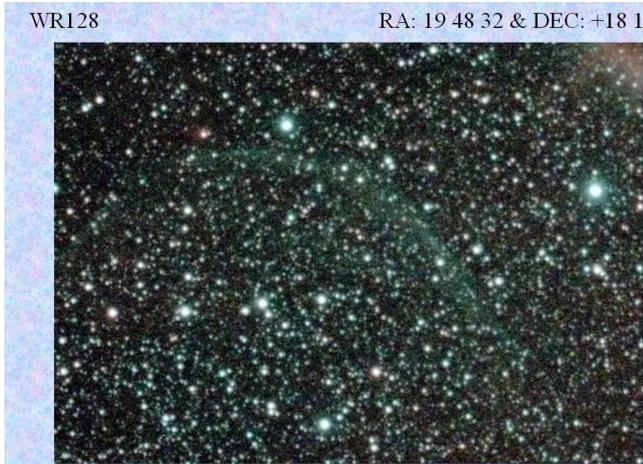
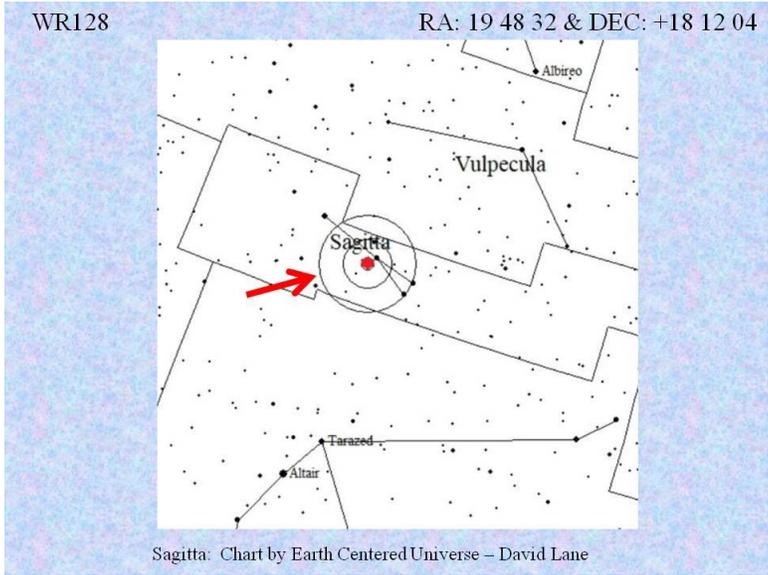
Also known as Minkowski 1-67, it was discovered in 1938 by American astronomer Paul Merrill at Mt Wilson Observatory. A small, moderately bright WR shell, (around 6 light-years in diameter), surrounds the central star, resembling a planetary nebula. The ionizing central WR star is +11.2 magnitude variable star QR Sagittae, and is located about 21,000 light-years away. The relatively young 8.5 million year old star is one of the fastest runaway stars in the Milky Way with a radial velocity around 200 km/s. Merrills Star may have been a member of a multiple-star system or cluster and was ejected by gravitational interactions at high velocity.

8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanca filter @ 60 seconds livestacked for 30 minutes.

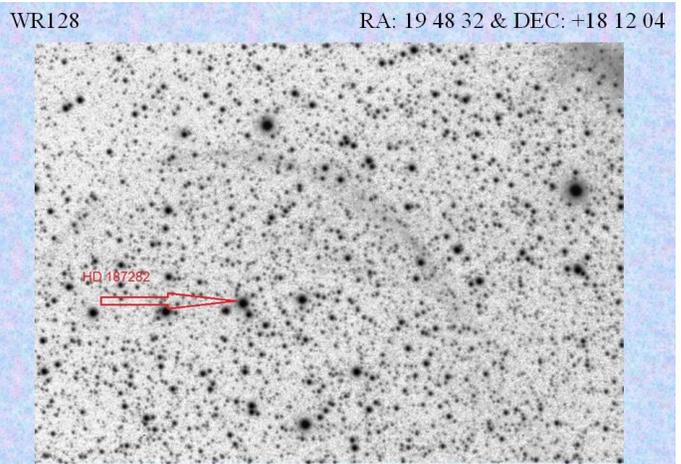


**WR128** – also located in Sagitta near the bright +3.8 mag central asterism star Delta Sagittae at RA: 19 48 32 DEC: +18 12 04

Nearby is the bright emission nebula SH2-84 (also known as LBN131) that I initially mistook for the Wolf-Raylet shell. The +10.5 mag Wolf-Rayet star HD187282 is located in what would be the bubble shell center, but only a small, thin, faint, partial arc is visible using EAA observing techniques. Both WR star and shell are about 9,500 light years distant. 8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanche filter @ 180 seconds livestacked for 30 minutes.



(8" SCT f6.3 & ZWO ASI294MC and L-eNhanche filter, 180 second subs for 30 minutes)

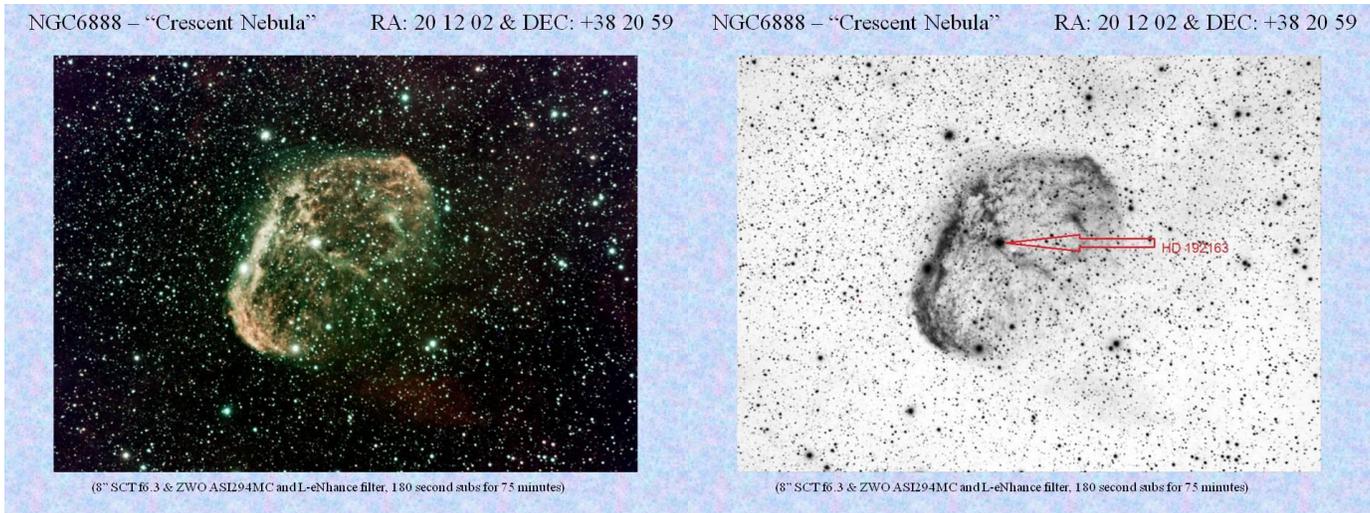
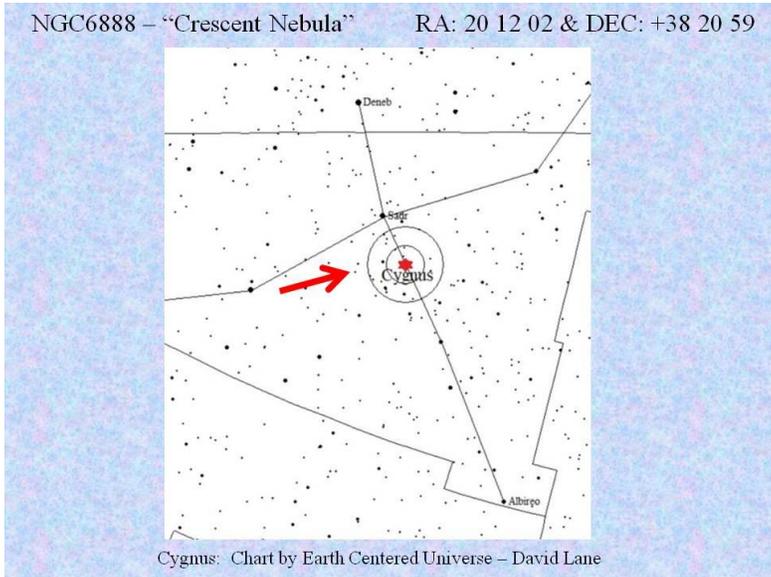


(8" SCT f6.3 & ZWO ASI294MC and L-eNhanche filter, 180 second subs for 30 minutes)

**NGC6888 SH2-105 WR136 – “Crescent Nebula”**, star=HD 192163 located in Cygnus, near the center of the ‘Northern Cross’ asterism, just south of the bright +2<sup>nd</sup> mag star Sadr, at RA: 20 12 02 & DEC: +38 20 59.

This shell (Also known as SH2-105), is somewhat faint, requiring a moderate size telescope (10” to 12”) to visually see the brightest arc shaped portion of the nebula that bisects a triangle of 7<sup>th</sup> and 9<sup>th</sup> magnitude stars in a rich FOV. With larger telescopes and narrowband filters under dark skies, the crescent shape is more pronounced, and using EAA techniques, the interior is filled with nebulous knots and filaments that give the object the look of a brain. Located slightly off-center is +7<sup>th</sup> HD192163 (WR136), the central star forming the shell, and is about 6,700 light years distant. (livedstacked using Sharpcap).

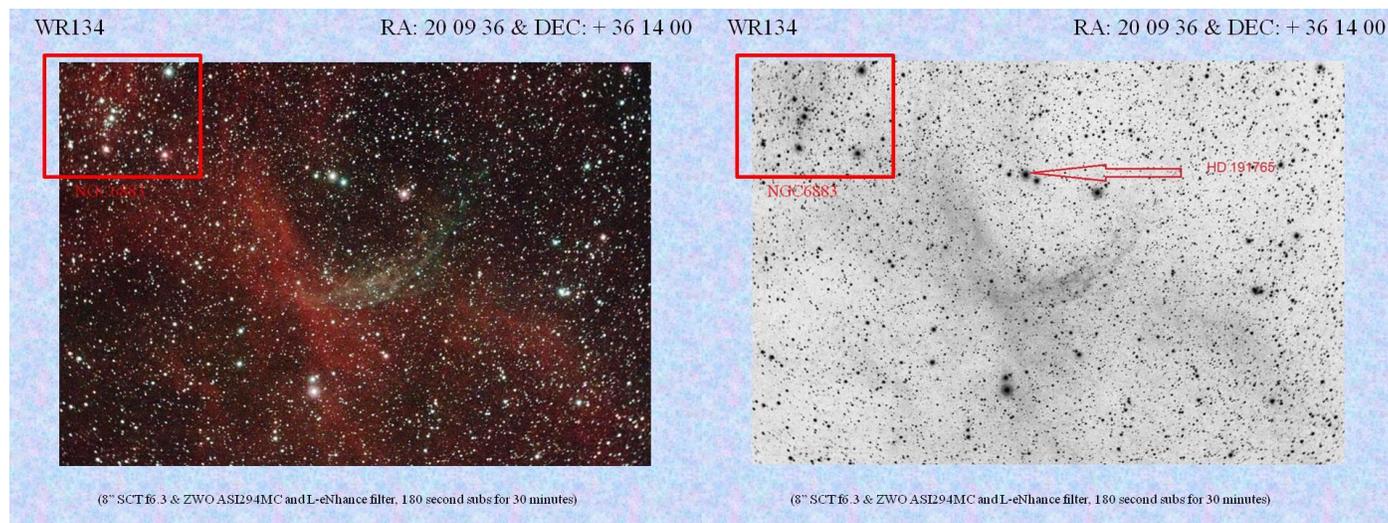
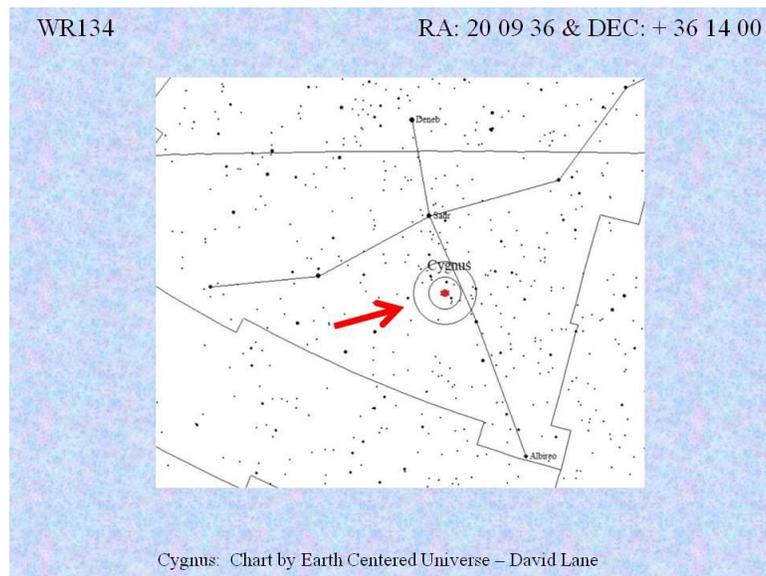
8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanche filter @ 180 seconds livedstacked for 75 minutes.



**WR134** – also located in Cygnus, a little further south of the Crescent Nebula, near open cluster NGC6883, at RA: 20 09 36 DEC: + 36 14 00

The +8th mag WR star HD191765 shell is a very faint wispy arc, visible in only large telescopes using narrowband filters or by using EAA. The partial crescent shape of the WR shell is embedded in a much larger and brighter HII nebulosity associated with cluster NGC6883. The WR star is located about center of the shell if the remaining sections of bubble were visible. WR132 was one of the first three WR stars discovered in 1867 by astronomers Wolf & Rayet. Both WR star and shell are about 5,700 light-years distant.

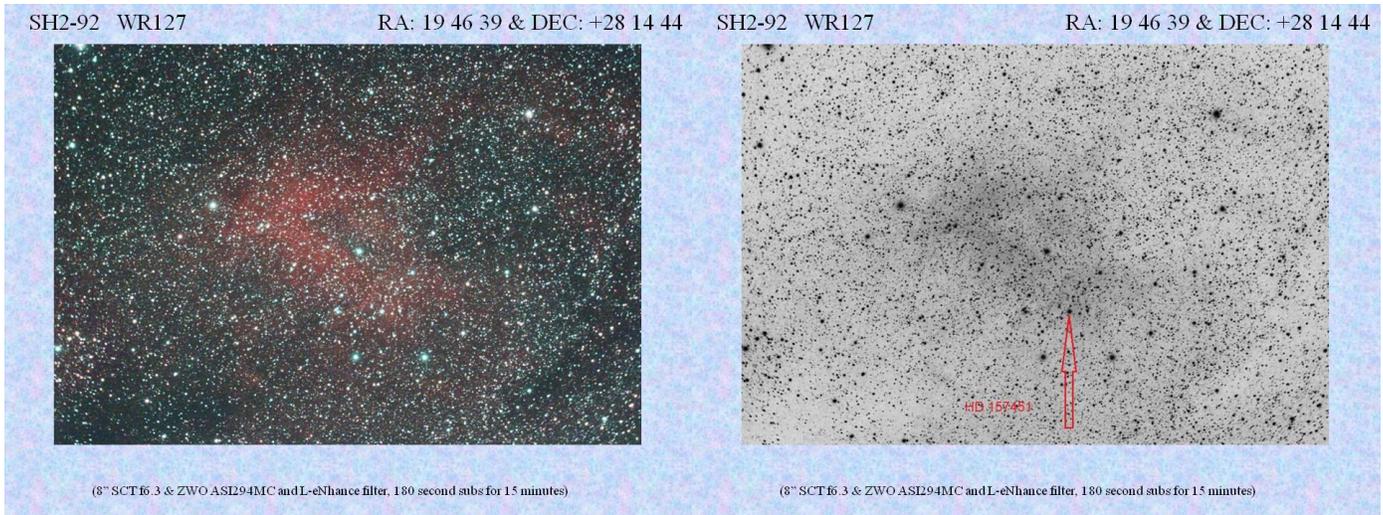
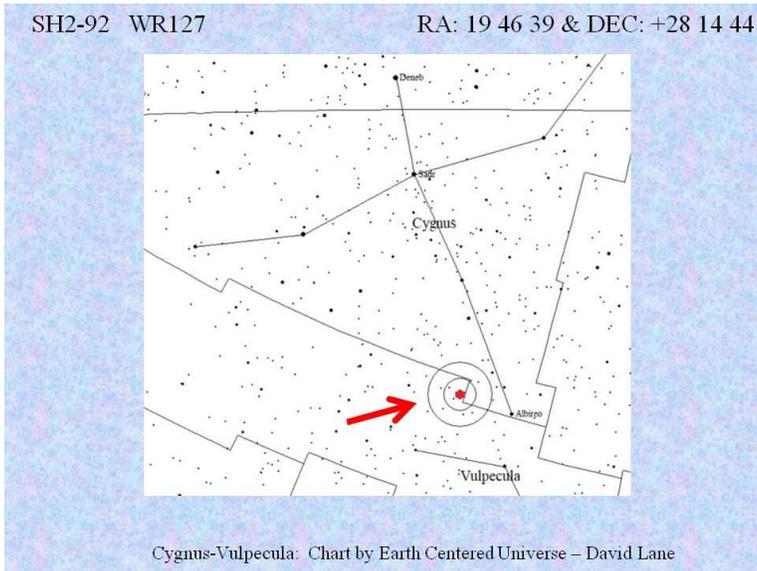
8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanche filter @ 180 seconds livestacked for 30 minutes.



**SH2-92 WR127** – continuing down Cygnus near the head of the swan Alberio, just across the border into Vulpecula, at RA: 19 46 39 DEC: +28 14 44

At about 12,000 light-years distant. The +10.2 mag WR star HD157451 is ionizing a large, faint oval-shaped HII region. Visually, only in larger size telescopes using narrowband filters will pull out the nebulosity, but imagers will do much better. The WR star is located off to one side of the HII region.

8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhance filter @ 180 seconds livestacked for 15 minutes.



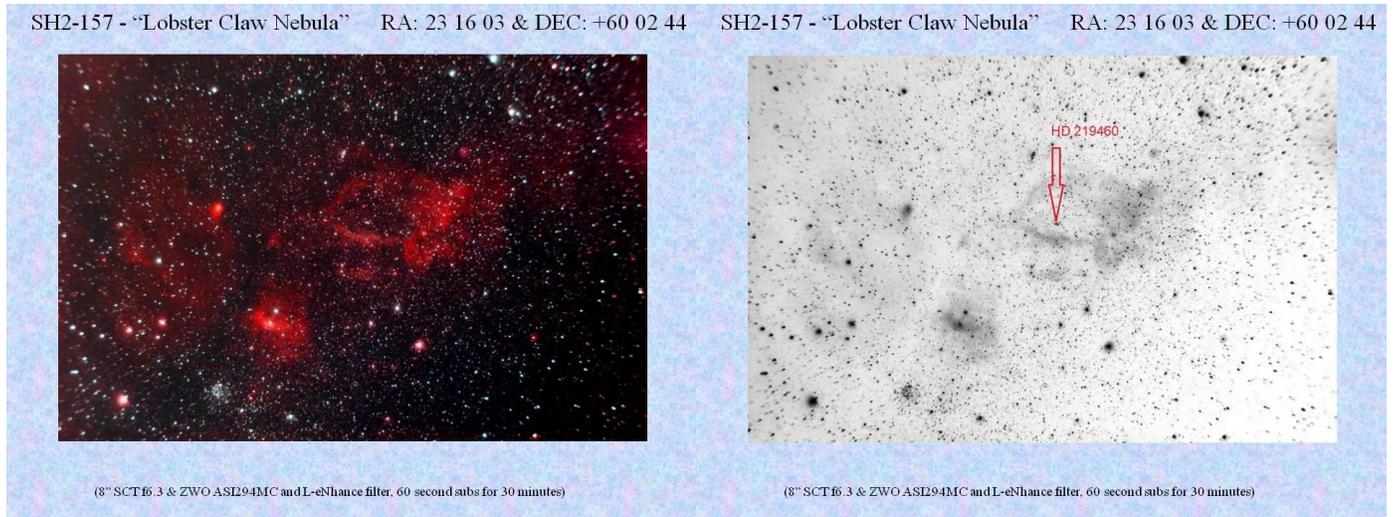
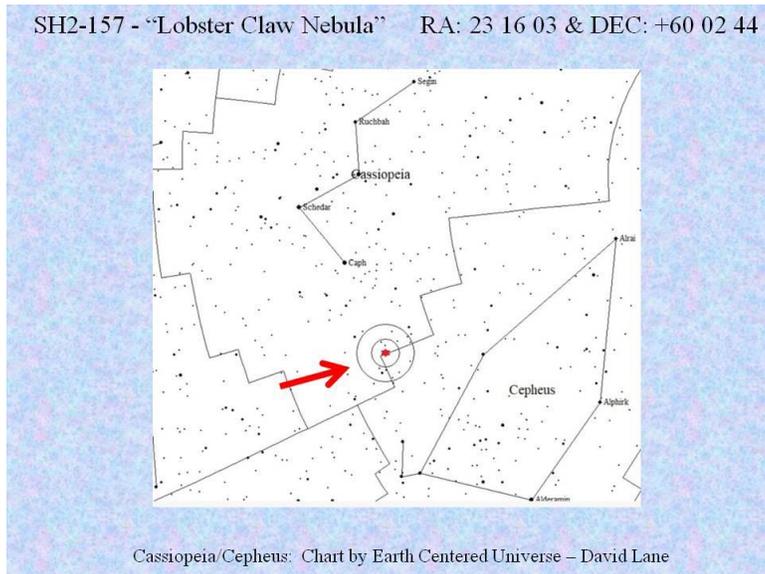
**Fall:**

**SH2-157 WR157 - "Lobster Claw Nebula"** located on the Cassiopeia/Cepheus border,

At RA: 23 16 03 DEC: +60 02 44

Near the open cluster M52, this large, moderately bright shell is best visible in widefield telescopes using narrowband filters. For EAA'ers, using your imagination, you can see a lobster claw shape made by two sides of the shell and an HII area on one side. The northern filament of the shell is the brightest. The +10.5<sup>th</sup> mag WR star HD219460, (WR157) is part of the small open cluster Markarian-50, (also called Basel-3), consisting of mostly young class "O" stars. The WR star and nebula is about 11,280 light years distant.

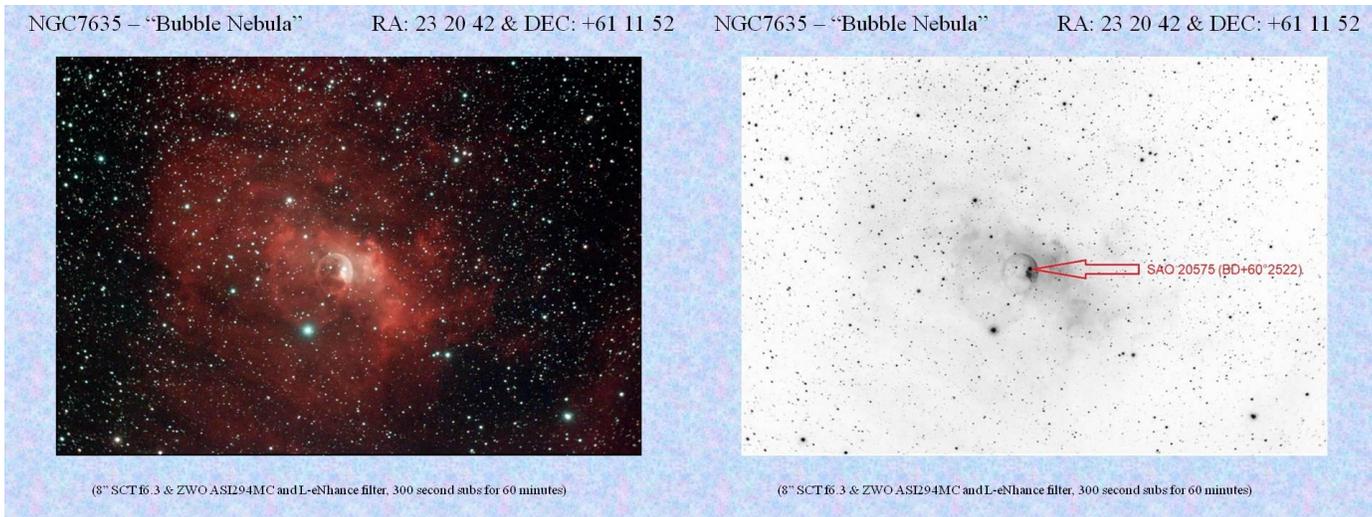
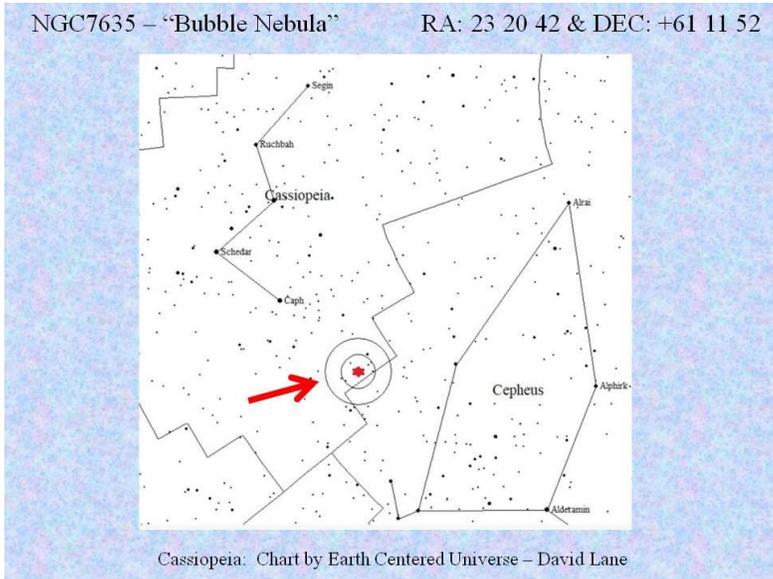
80mm f4 Refractor, Atlas Gem, ASI294MC & L-eNhanca filter @ 60 seconds livestacked for 30 minutes.



**NGC7635 SH2-162 - "Bubble Nebula"**, star= SAO 20575 (BD+60°2522) in Cassiopeia, close to the border with Cepheus, at RA: 23 20 42 & DEC: +61 11 52.

Also, located even closer to the open cluster M52, this extremely faint shell (Also known as SH2-162), embedded within an HII region is best seen visually using telescopes 16" or larger, along with using nebula filters. Most noticeable is the NE arc section of the bubble. EAA observers will be able to pull out the entire oval shaped shell using a OIII narrowband filter. The bright +8<sup>th</sup> magnitude "O" type star (SAO20575) near the NE arc is the central star of the shell, and is considered by some sources to be in the early WR stage of its life-cycle. The star is about 9,800 light years distant. (livestacked using Sharpcap).

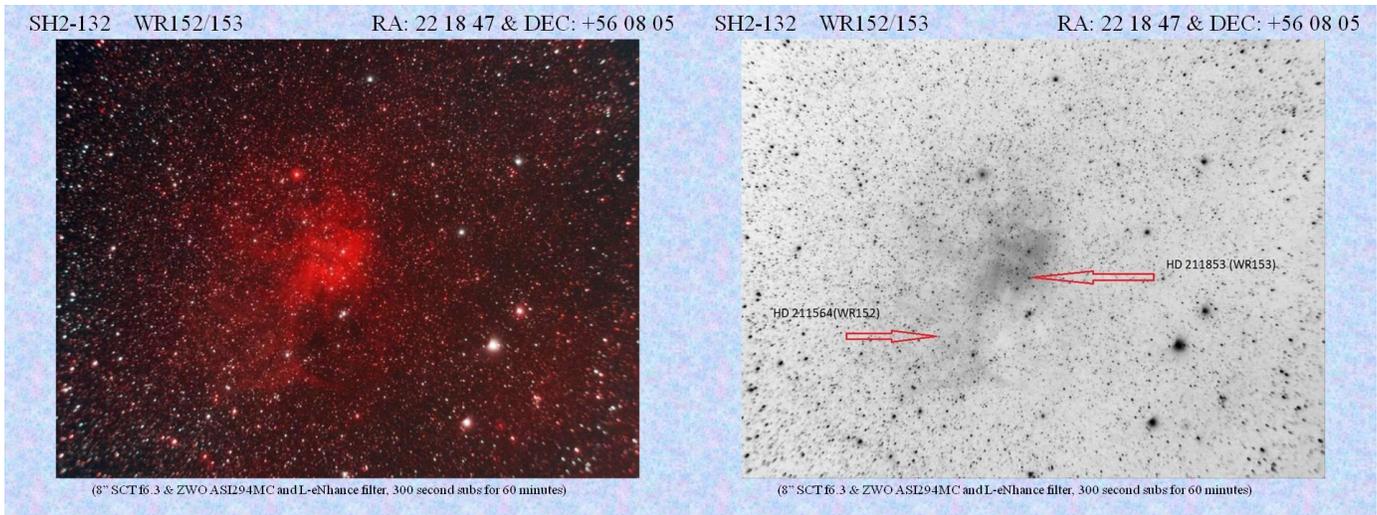
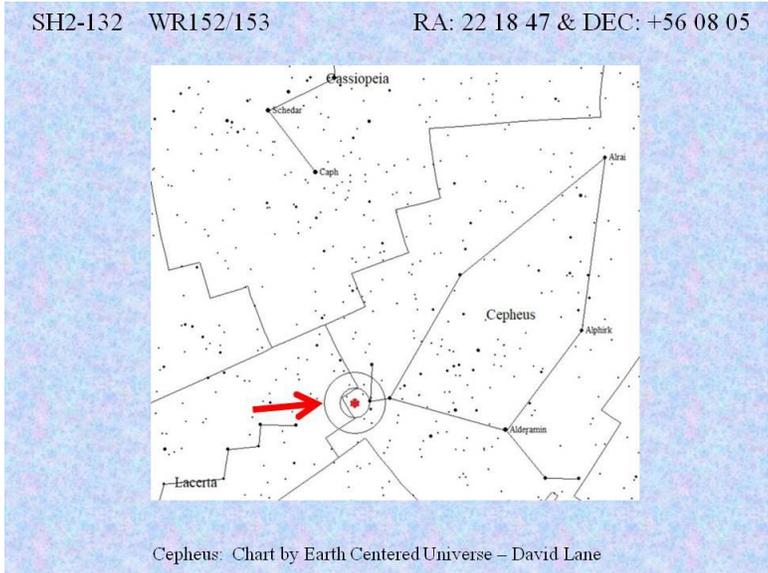
8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanche filter @ 300 seconds livestacked for 60 minutes.



**SH2-132 WR152/153 “Lion Head Nebula”**, located in Cepheus near Zeta and Epsilon Cephei by the border with Lacerta, at RA: 22 18 47 DEC: +56 08 05

This is a ‘twofer’ – two Wolf-Rayet stars, HD 211564 (WR152) and HD 211853 (WR153), lie close together, both ionizing a large nearby HII region. Both stars and the fairly dim HII nebula are about 10,370 light years distant. While there’s no observable visual shell, a radio shell has been detected around WR153.

80mm f4 Refractor, Atlas Gem, ASI294MC & L-eNhanche filter @ 60 seconds livestacked for 30 minutes.



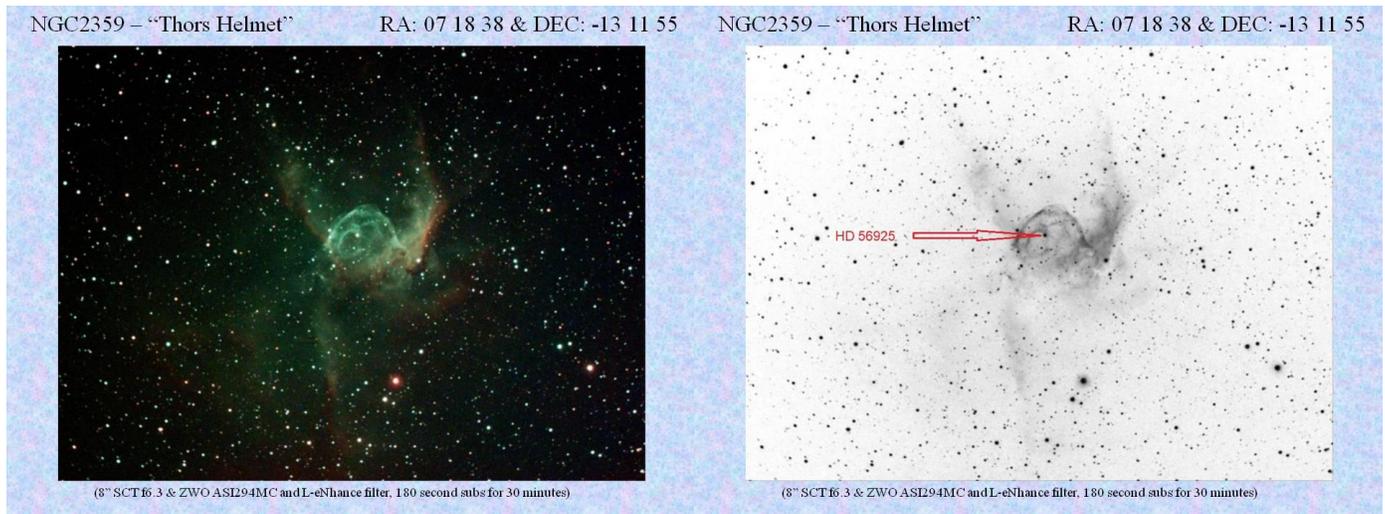
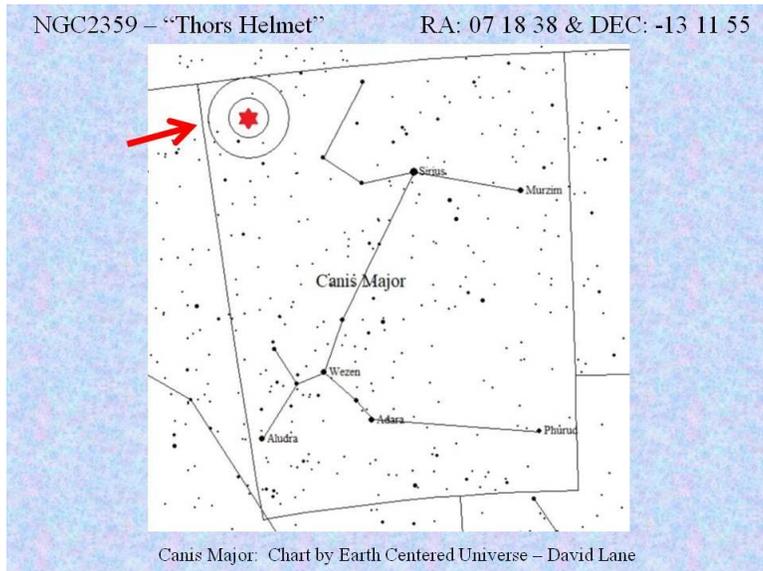
**Winter:**

**NGC2359 SH2-298 WR7 - "Thor's Helmet"**, located in Canis Major near the border with Monoceros, at RA: 07 18 38 & DEC: -13 11 55 .

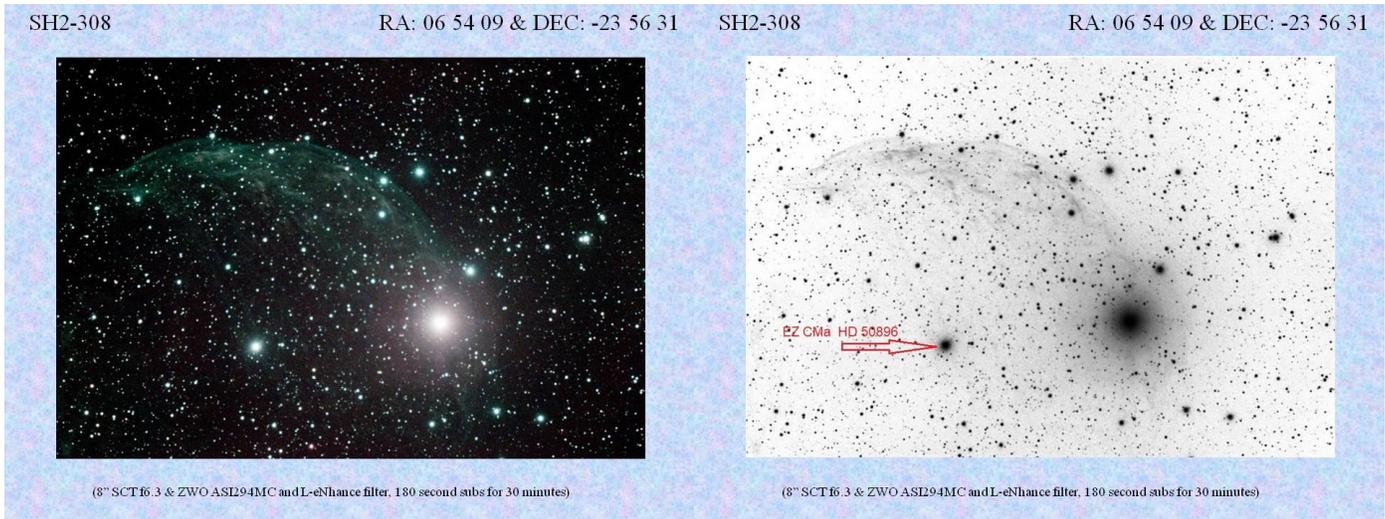
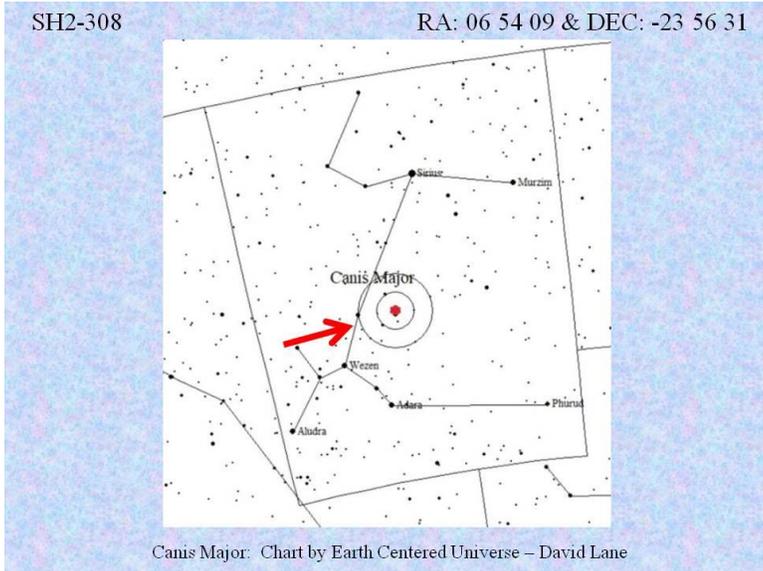
(Also known as SH2-298, and sometimes called the "Duck Nebula" by visual observers who see the profile of a duck). This WR Shell is easily visible as a crescent shape in small telescopes under a dark sky, with larger scopes showing more details such as two 'extrusions' on either side of the crescent. A UHC or OIII filter will greatly improve the view. Imagers or EAA'ers will be able to pull out much more interior filaments and striations.

Using just a little imagination, it's easy to see the upward pointing two-horned Viking helmet shape, along with the fainter lower helmet-strap extensions. The intricate shape of the emission nebula is caused by strong stellar winds coming off of its central star, +11<sup>th</sup> magnitude HD56925, (WR7). The star/nebula is about 12,000 light years distant. (livestacked using Sharpcap).

8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanche filter @ 180 seconds livestacked for 30 minutes.



**SH2-308 WR6** located in the central 'body' of Canis Major about 3.5 deg south of the open cluster M41, very close to bright +3.8<sup>th</sup> mag star Omicron (16) Canis Majoris, at RA: 06 54 09 DEC: -23 56 31.  
 The brightest NW section of the faint arc of the shell resembles a section of the Veil Nebula SNR, and is visible in larger telescopes. Imagers with wide-field telescopes and taking deep exposures with narrowband filters can bring out the entire bubble shape. The +6.9 mag star HD50896 (WR6), also known as EZ Canis Majoris, is the central Wolf-Rayet star at about 4,900 light-years from Earth.  
 (livestacked using Sharpcap).  
 8" SCT optical tube @ f6.3, Atlas Gem, ASI294MC & L-eNhanche filter @ 180 seconds livestacked for 30 minutes.



Larry McHenry  
 Astronomical Webportal: <http://www.stellar-journeys.org/>

**Credits:**

**Amateur Images:** EAA capture Images: Larry McHenry - <http://stellar-journeys.org/>

**Planetarium Software:** "Earth Centered Universe" planetarium software by David Lane <http://www.nova-astro.com/>