

## Small Wonders: Cygnus

A monthly sky guide for the beginning to intermediate amateur astronomer

Tom Trusock

10-Aug-2005

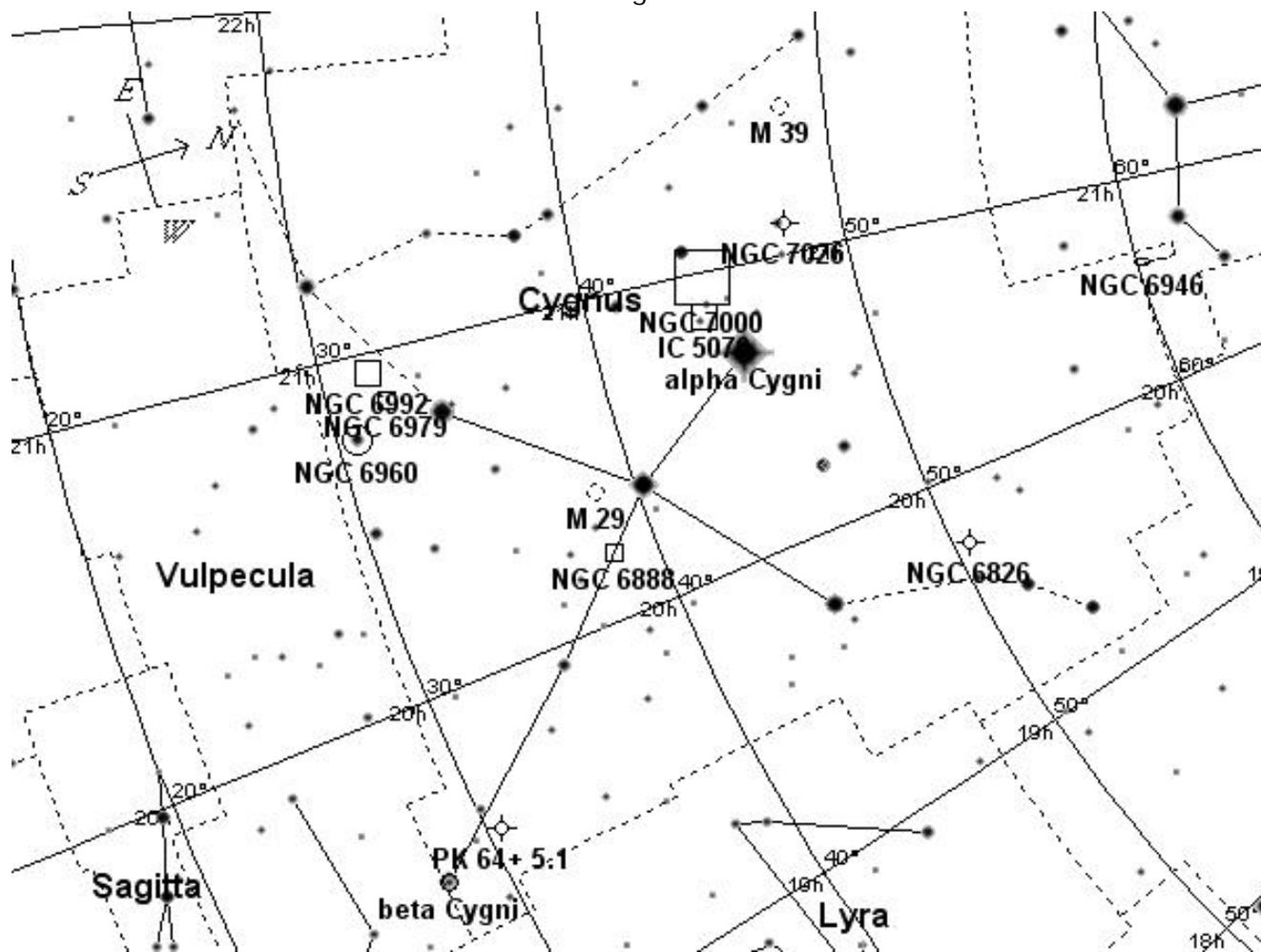


Figure 1: Widefield Map

## Target List

Object	Type	Size	Mag	RA	Dec
$\alpha$ (alpha) Cygni (Deneb)	Star		1.3	20 <sup>h</sup> 41 <sup>m</sup> 38.7 <sup>s</sup>	45 17' 59"
$\beta$ (beta) Cygni (Albireo)	Star		3	19 <sup>h</sup> 30 <sup>m</sup> 57.9 <sup>s</sup>	27 58' 18"
NGC 7000	Bright Nebula	120.0'x100.0'	4	20 <sup>h</sup> 59 <sup>m</sup> 03.2 <sup>s</sup>	44 32' 16"
IC 5070	Bright Nebula	60.0'x50.0'	8	20 <sup>h</sup> 51 <sup>m</sup> 01.1 <sup>s</sup>	44 12' 13"
NGC 6960	Supernova Remnant	70.0'x6.0'	7	20 <sup>h</sup> 45 <sup>m</sup> 57.0 <sup>s</sup>	30 44' 12"
NGC 6979	Bright Nebula	7.0'x3.0'		20 <sup>h</sup> 51 <sup>m</sup> 14.9 <sup>s</sup>	32 10' 14"
NGC 6992	Bright Nebula	60.0'x8.0'	7	20 <sup>h</sup> 56 <sup>m</sup> 39.0 <sup>s</sup>	31 44' 16"
M 29	Open Cluster	10.0'	6.6	20 <sup>h</sup> 24 <sup>m</sup> 11.6 <sup>s</sup>	38 30' 58"
M 39	Open Cluster	31.0'	4.6	21 <sup>h</sup> 32 <sup>m</sup> 10.4 <sup>s</sup>	48 26' 40"
NGC 6826	Planetary Nebula	36"	8.8	19 <sup>h</sup> 44 <sup>m</sup> 58.8 <sup>s</sup>	50 32' 21"
NGC 7026	Planetary Nebula	45"	10.9	21 <sup>h</sup> 06 <sup>m</sup> 31.4 <sup>s</sup>	47 52' 28"
NGC 6888	Bright Nebula	18.0'x13.0'	10	20 <sup>h</sup> 12 <sup>m</sup> 20.0 <sup>s</sup>	38 22' 18"
NGC 6946	Galaxy	11.5'x9.8'	9	20 <sup>h</sup> 35 <sup>m</sup> 01.0 <sup>s</sup>	60 10' 19"

## Challenge Objects

Object	Type	Size	Mag	RA	Dec
PK 64+ 5.1	Planetary Nebula	5"	9.6	19 <sup>h</sup> 35 <sup>m</sup> 02.3 <sup>s</sup>	30 31' 45"
Sh2-112		9.0'x7.0'			

## Cygnus

Cygnus is a spectacular summer constellation. For observers at mid-northern latitudes, it passes directly through zenith and thus offers some of the best views of the Milky Way one can see without traveling south. There's a little of everything in Cygnus and I could spend the next couple of months doing it justice – so instead, I've picked out a small representative sample of objects for this month's Small Wonders.

One extremely fun thing to do with the summer Milky Way is to grab a decent pair of binoculars and just scan from horizon to horizon and ogle the rich field targets that pop into view. Many of the targets this month are easily visible in binoculars. In fact, many of the targets are best seen in binoculars. Heck, there's even one that I'll talk about (it's not in the list however) that's best seen with the naked eye!

We'll start with the constellation itself. Cygnus is (amazingly enough) a constellation that even we unimaginative modern luddites can visualize as its namesake – the swan. But from whence did this celestial avian come? Rumor has it, one explanation for the Swan's presence in the celestial sphere lies in ancient Greco-Roman mythology. Cygnus, is really the god Zeus embodied in Swan form. Why you might ask? Well, it's obviously to seduce Leda (the king of Sparta's wife). For reasons unclear to this writer, he apparently thought his odds would be better as a swan than the head god in the given pantheon. He was evidently right, and the result was Pollux. Go figure. Another possible origin for the celestial bird, lies with Cynus, Poseidon's son. Abandoned by his parents and raised by a swan, Cynus was eventually turned into one by Poseidon after he was killed by Achilles. (Do these ancient Greek / Roman myths remind anyone else of today's soap operas?)

In any case, the bird form is not much of a stretch, and has in fact been seen as one avian or another from ancient times and across many cultures. However, just in case, some of us have problems connecting the dots (and adding a few feathers) the constellation is also nicknamed "The Northern Cross".

## Alpha Cygni (Deneb)

Two of the more interesting stars in the constellation are found at the tip of the head and the tail respectively. Alpha Cygnus (Deneb) marks the tail of the celestial swan and is one of the

components of the Summer triangle – the others being Vega (Lyra) and Altair (Aquila). At mag 1.25 Deneb is the 19<sup>th</sup> brightest star in the night sky. Its brightness is somewhat amazing in relation to its distance. Most bright stars are relatively close. Not Deneb. Distance estimates place it at 3229 +/- 1165 light years. While it's not a particularly huge star, if placed at the center of the solar system, it would swallow earth and be 160,000 times brighter than the sun. Jim Kaler (on the STARS website) reports that it's probably stopped fusing hydrogen and is due for an explosion in the next couple of million years. I guess the motto is enjoy the summer triangle while you've got it.

### ***Beta Cygni (Albireo)***

The bird's head is marked by a beautiful double that's a favorite at summer star parties. Beta Cyg (Albireo) is a widely separated double whose colors of blue and gold offset each other nicely. While color is often subtle thing in the night sky, it helps that these two stars are right next to each other to provide contrast. Albireo has a separation of around 34 arc seconds, and the primary is magnification 3.5 while the dimmer component is mag 5. Multiple stars are estimated to be more common than singlets, making our solar system (again) something of an odd man out. Albireo is at its best in small telescopes and moderate magnifications.



**Figure 2: Albireo image contributed by Bill Warden**

### ***The Milky Way***

Another area to take a long glance at around here is the Milky Way itself. Starting just below Deneb and heading south, we can see the beginning of the "great rift" a massive dust lane that blocks our view of the Cygnus arm. The area just south of Deneb where the great rift begins (visible to the naked eye) is catalogued as LDN 896 and referred to as the Northern Coalsack. Just north of Deneb, there's a more prominent hole in the sky that's often confused for Northern Coalsack – and with good reason. While gazing at this area with my naked eyes one night, I was struck by the chunk of Milky Way that someone had removed from the galactic arm there and seemingly transported to the middle of Cygnus.

There's a plethora of wonderful telescopic deep sky targets in Cygnus, so let's get started.

### NGC 7000 and IC 5070

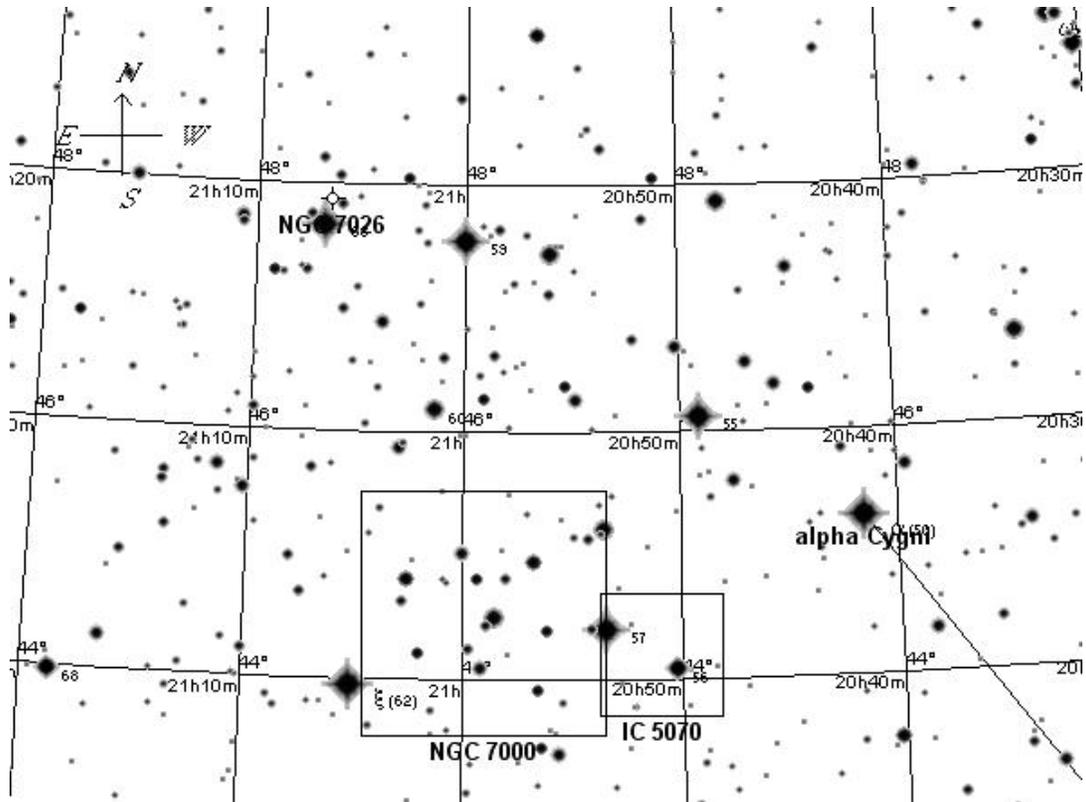


Figure 3: Area map of NGC 7000 and IC 5070

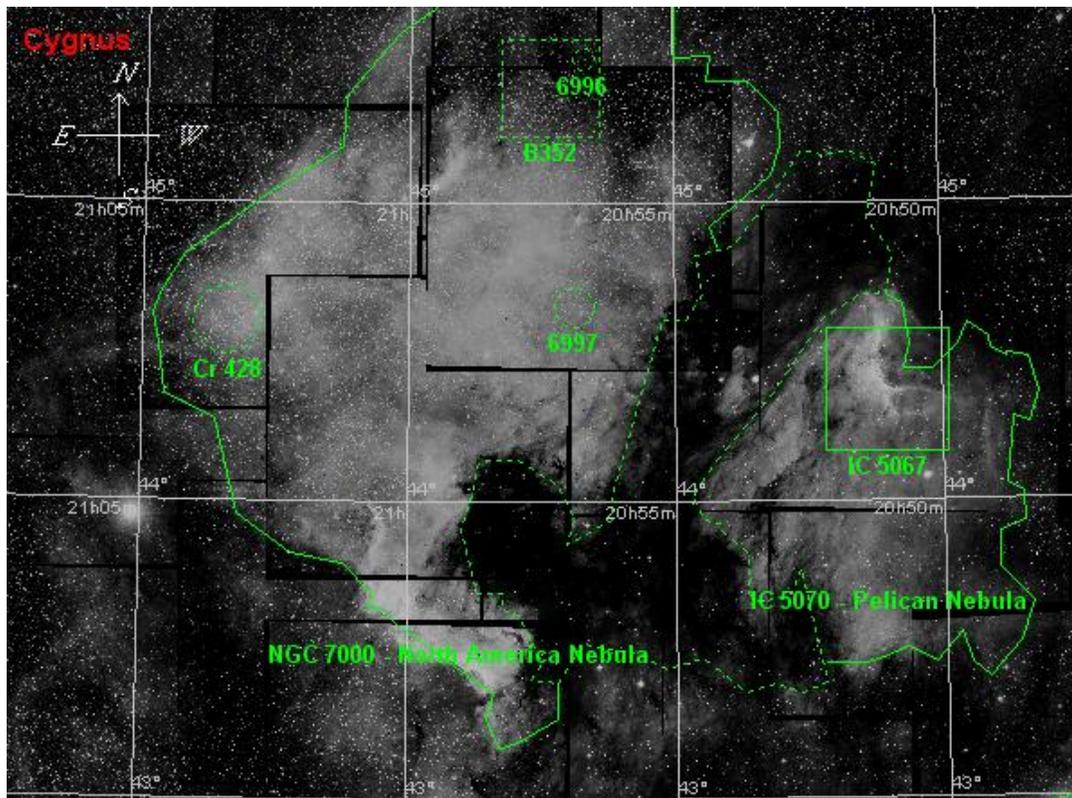


Figure 4: NGC 7000 and IC 5070 (DSS)

Three degrees almost directly east of Deneb, we come across one of the most photographed nebulae in the night sky. The North American Nebula is spectacular in long exposure photographs, and unlike many objects in the sky clearly resembles its namesake. Until recently tho, its been considered a challenge object. I've found its visibility is heavily dependent on sky conditions, and frequently have found it easier to view in smaller instruments than larger ones. Two of the reasons for this are undoubtedly the vast amount of nebulosity in the region and its sheer size. At over three degrees, only a widefield scope or pair of binoculars will allow you to see it in its entirety. Reports of visibility with the naked eye vary. While I can see a haze in the proper position, I've never been convinced that I'm actually seeing the nebula instead of a mass of unresolved stars in the Milky Way. Others say they can clearly make out the form. Take a look and make up your own mind. On a good night, I've viewed it with instruments as small as 12x36 binoculars, and not found it particularly difficult.

\*Slightly\* larger scopes do tend to provide better views. From a dark site, and observing buddy and I were recently treated to an excellent view of the North American using a 66mm telescope coupled with a 20mm widefield eyepiece and UHC filter. With my widest field eyepiece, the Nebula just fits in the field of view of my 880mm focal length 4" apo. A friends 4" 540mm apo framed the target much better. In my opinion, larger telescopes than this tend to provide too much magnification and thus to narrow a field of view. For the best views, I like an eyepiece telescope combination that provides at least three degrees (six times the width of the full moon). I find the brightest portion to be the Mexico / Central America area, which points towards the south. Keep an eye out for orange Xi Cygni off the coast of California. This celestial beacon can interfere with your views of the nebula. If it does, be sure to place it outside of the field of view.



**Figure 5: IC 5070 (Pelican) - Image contributed by Nick King**

While you're in the area, take a moment and scan the Atlantic coast off the Florida region for the Pelican Nebula. I find it easier to see than pictures of the region would leave you to believe, and find it surprising that many people don't seem to bother even looking. Again, it's a large diffuse

target so low powers and wide fields are a must. In the 66mm Petzval (coupled with a UHC filter and a dark site) I've found the beak of the Pelican to be amazingly like Nick King's long exposure photograph above. Surprisingly, it's not that difficult of an object, but like the North American is dependent on wide fields, low powers and sky conditions.



**Figure 6: NGC 7000 image contributed by Nejc Ucman**

Mathieu Chauveau - Observing from France writes;

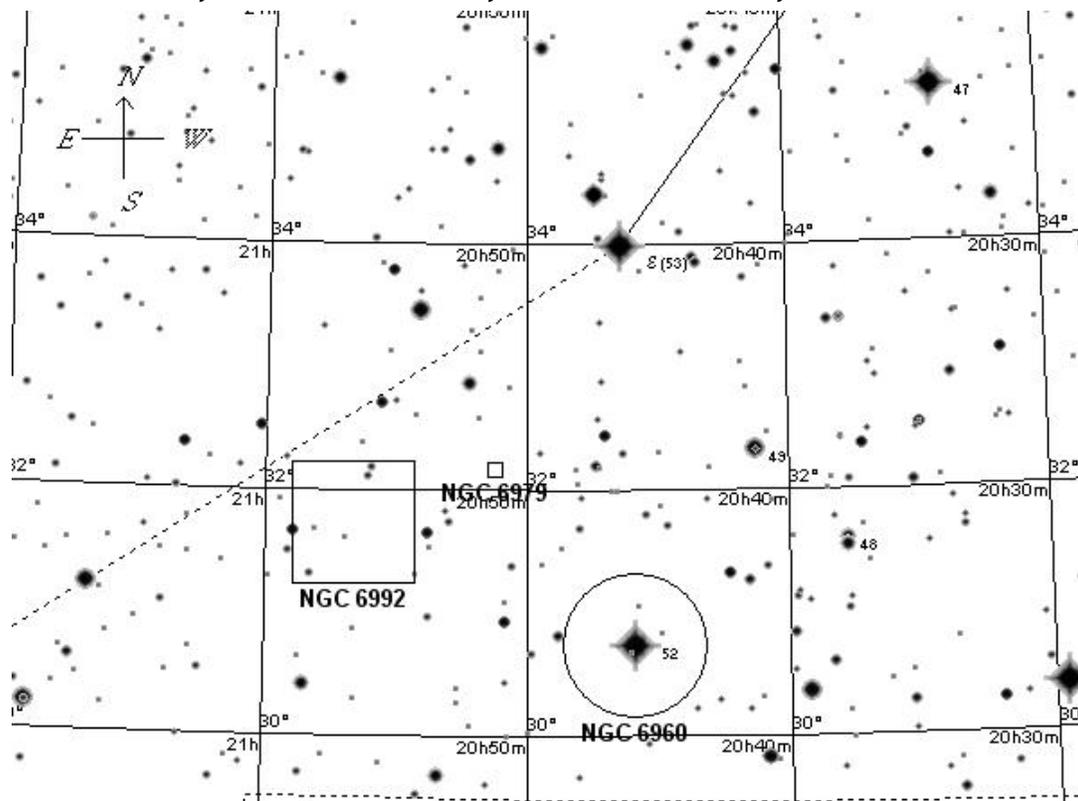
*My best views of the North America have been with a 6" Mak-newt. It has a combination of low magnification and excellent contrast (high transmission lenses and superior baffling) which makes that it's the only scope with which I can see the NA shape clearly. The best*

*filter is an UHC-type, though a deep-sky type helps too for low magnifications, even under dark skies. Only in "arctic Canada" is the limit not defined well (I guess that's because of our melting polar caps); the brightest "edge" is the Gulf of Mexico region. I do not notice features within the nebula, only slight changes in luminosity. I also noticed that "Florida" is much more visible than you would expect from the photographs. The Pelican is right off the "coast", and I can see some "draping" features in it, much like what you see in the pictures..*

I find Matt's comments about trying to observe the North American with a large scope to match my experiences perfectly

*On my 16" dob, the magnification is too high: you notice the sky background is not as dark as it was before, but it's like trying to see the shape of North America in a plane at 30,000 feet: not enough distance. Also, with 16" of aperture, the star field (even with a narrowband filter) is much too bright to see the nebula well (remember, the brightness of extended objects depends on the exit pupil, but the brightness of stars depends on the aperture). My recommendation is that if you try to look at this thing with anything less than 1.5° of FoV, you are in for a frustrating experience.*

### **The Veil – IC 1340, NGC 6992/6995, NGC 6979/6794, NGC 6960**



**Figure 7: Area map of the Veil**

15,000 years ago, a supergiant star in Cygnus (at least 8 times the mass of the sun) died in a Type II Supernova.

The result is easily one of the most spectacular sights in the night sky - in any aperture. I've seen it in everything from 12x36 binoculars to 25 inch telescopes, and every size telescope has something to offer – usually a jaw dropping, time stealing, eyeball popping view. If you think the still Messiers are the best objects in the night sky, you are gonna be in for a surprise.

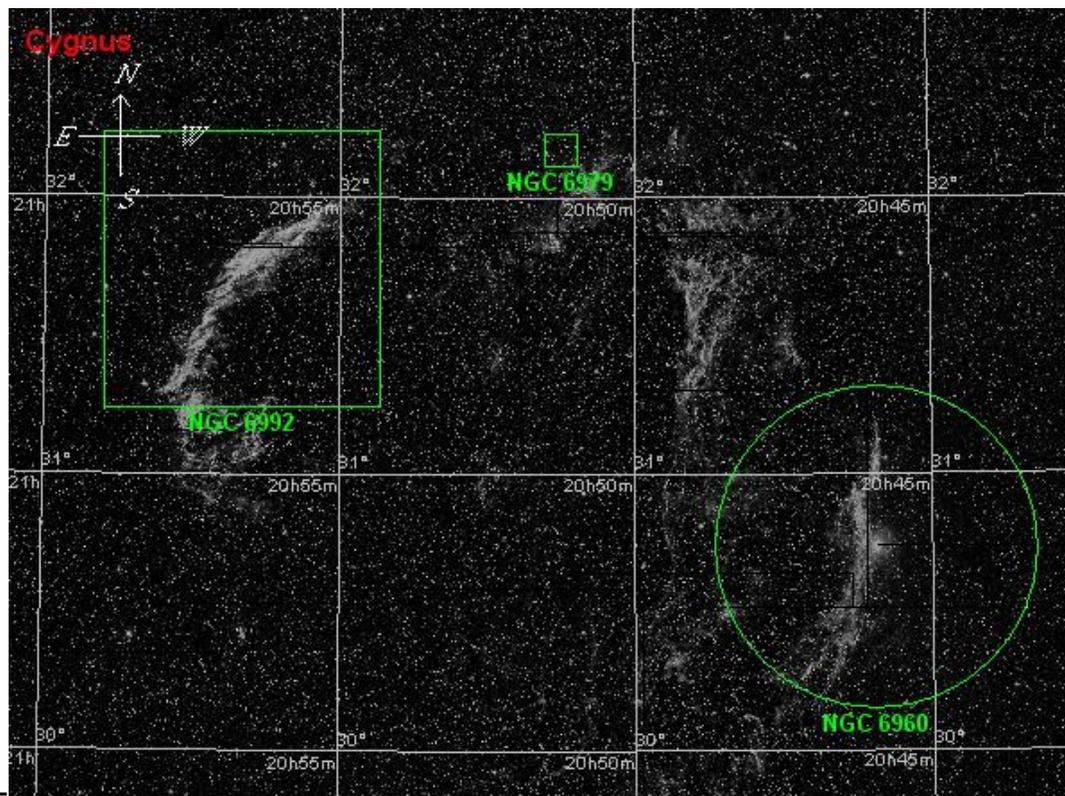


Figure 8: The Veil (DSS)

There are three main sections: 6992/6995 (the Bridal Veil or Network Nebula), 6979/6794 (Pickering's Triangular Wisp), and 6960 (The Finger of God or the Filamentary Nebula), and viewed from a dark site, in a large scope, the nebula seems to be nearly without end.



Figure 9: NGC6960 image contributed by Nejc Uzman

The Finger of God is visible in small telescopes and binoculars, but the glare from 52 Cygni can make observations difficult. If you have access to an OIII or UHC filter, you might give that a try. I see the Finger of God as a broom like shape that runs north/south through 52 Cygni, with the

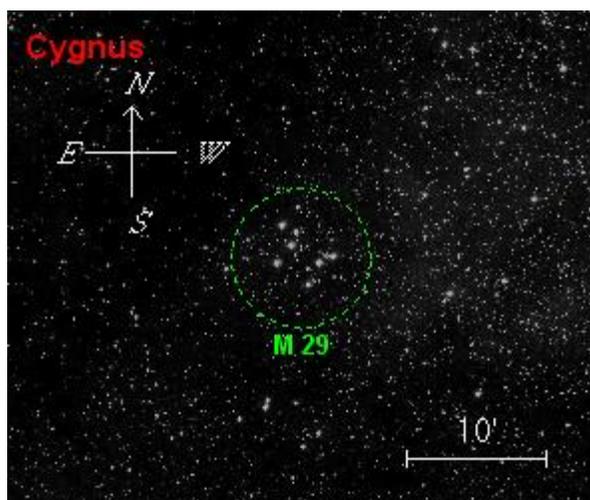
broom on the southern side. Views at moderate magnifications with a large telescope clearly reveal how it got its nickname.

The most obvious section is the Bridal Veil. With decent sky conditions, and a NELM of 5.5, the Bridal Veil is easily visible in a set of Canon 12x36 image stabilized binoculars as an arcing wisp of brightness against the night sky. It becomes far more visible in my 66mm telescope – especially when an OIII or UHC filter is used.

I find both of these sections difficult to pick out from the background until a filter is used, and then you wonder how you ever missed it. For larger apertures, I feel the Veil responds better to an OIII filter than a UHC type, but both can provide you with spectacular views depending on the particular pass band of the filter in question. With a moderately sized telescope, you can spend hours tweaking out the detail present. If you have some serious aperture, you're in for an immense treat. I was recently treated to the best view I've ever had of the Veil while comparing my TV102 and a buddies NP101. We were both using OIII filters, but his telescope provided a slightly wider true field of view and thus framed it a bit better allowing us to drink in the entire nebula at once. This is a LARGE object, if you want to appreciate it in its entirety, you need a minimum of a three degree field of view. If you want to give a detailed inspection of its structure, point as much aperture as you can at it. Views of the Veil through an 18" to 25" (or larger) telescope equipped with an OIII filter is enough to inspire awe in the most jaded amateur.

If you get both halves, take a while and scan for Pickering's triangle (the triangular patch near the middle). I've glimpsed it in scopes as small as 4", but to really appreciate it I find it takes something larger.

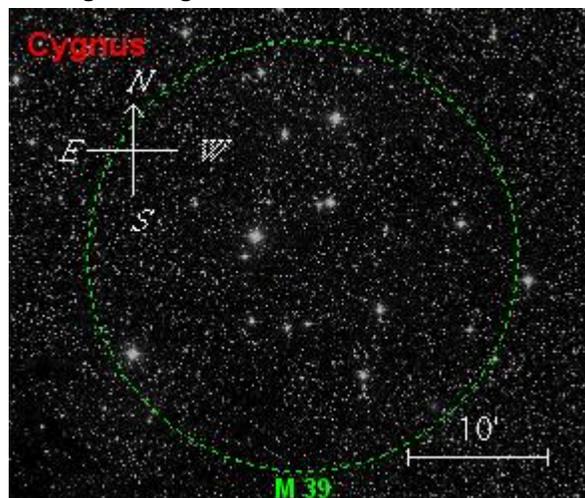
### **Messiers in Cygnus - M29 and M39**



**Figure 10: M29 – open cluster**

I find it curious that with the plethora of objects in Cygnus, only two were recorded by Messier, and both of those rather loose open clusters. Of the two, I find that I generally prefer the views of M29 through binoculars or a small telescope. I find that M39 does not stand out from the background as well, and tends to be come lost in the jungle of the Milky Way. M29 is a neat little cluster that tends to jump out at me through nearly any aperture and magnification. I tend to see M29 as a small chalice (somewhat

reminiscent of the constellation Crater), the goblet of Cygnus if you will, and find the best views to be in small scopes that will provide me around a two degree field of view. I think this is aesthetically the most pleasing way to view the cluster; set against the splendor of the Milky way. M39, I find to be large and sparse, a bit too much for my taste. Take some time and investigate both clusters in binoculars and a small telescope. Binocular observers have reported chains of stars, similar to Eric Graff's wonderful sketch, running through the heart of M29.



**Figure 11: M39 – open cluster**



Figure 12: M29 Sketch contributed by Eric Graff

**The Crescent Nebula – NGC 6888**

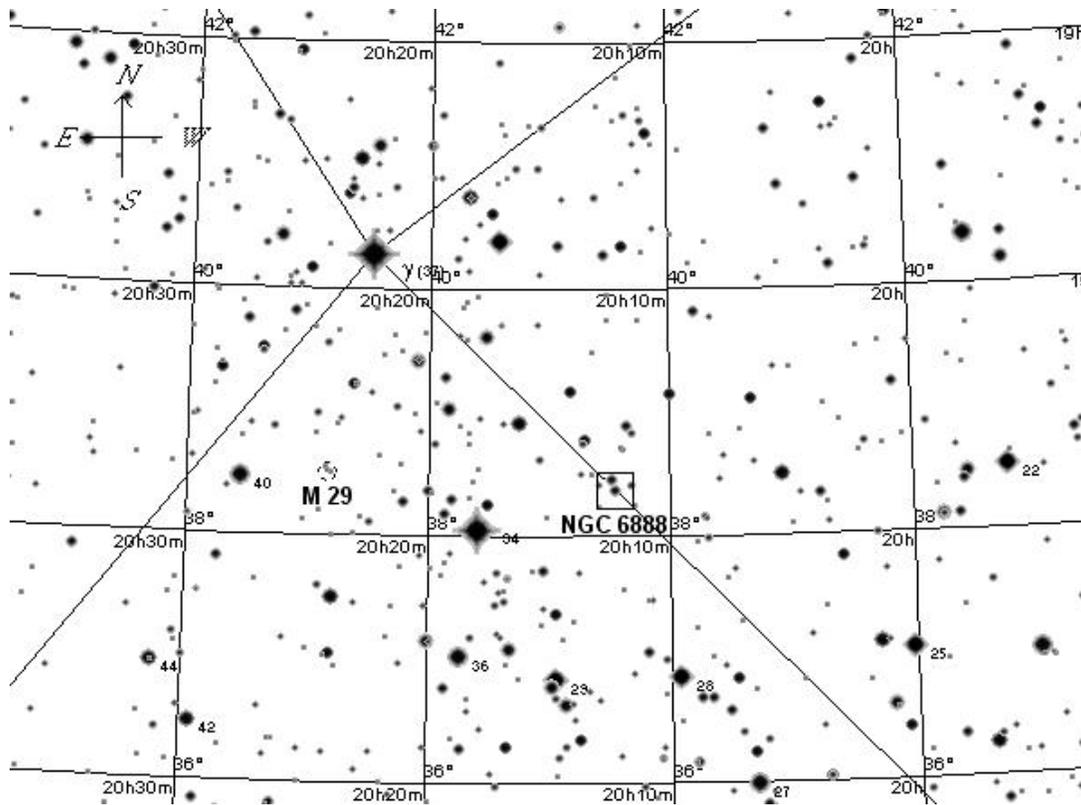
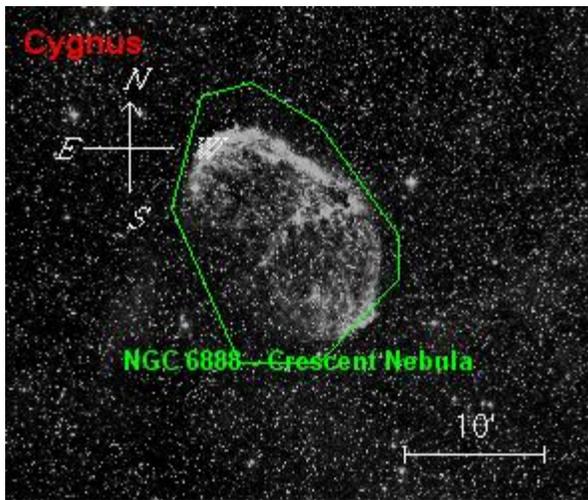


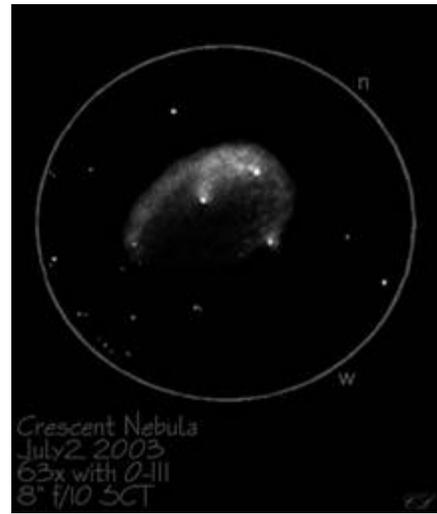
Figure 13: The Crescent Nebula



**Figure 14: NGC 6888 (DSS)**

This is an exceedingly tough target for a small telescope. From a dark site, I grabbed it only with difficulty in my 4" apo. I had to use 40x, an OIII filter and charts to actually confirm the exact location in order to convince myself that the slight brightening I was seeing was actually the nebula and not unresolved stars in the Milky Way background. In a larger scope, it becomes far

easier. In my 18" I found it quite obvious, and reminded me of the Bridal Veil portion of the Veil nebula when seen through small telescope from a dark site. I found that filters do improve the views – particularly the OIII.



**Figure 15: NGC 6888 Sketch Contributed by Carol Lakomiak**



**Figure 16: NGC 6888 Image contributed by Florent Pioget**

## NGC 6826 – The Blinking Planetary

Planetary Nebulae are, without a doubt, my favorite class of objects in the night sky. Cygnus is particularly blessed with these little creatures, and one of my favorites is 6826. I've seen 6826 in a variety of apertures, and I get a kick out of it every time. Like most planetary nebulae, the surface brightness is rather high, and they can be viewed in a large class of telescope. The best view I've ever had 6826 was through my clubs 25" telescope, and the most unique, through Gary Gibb's 15" I3 equipped Obsession. Both presented interesting, and similar, yet different views to your eye. If you aren't familiar with the I3 eyepiece, you might want to check out their website here: <http://www.ceoptics.com/>. Think night intensifier equipment mated to TeleVue optics. While it does not work equally well for all DSO's, it does provide some very interesting views of planetary nebulae, usually makes nailing the central star a snap.

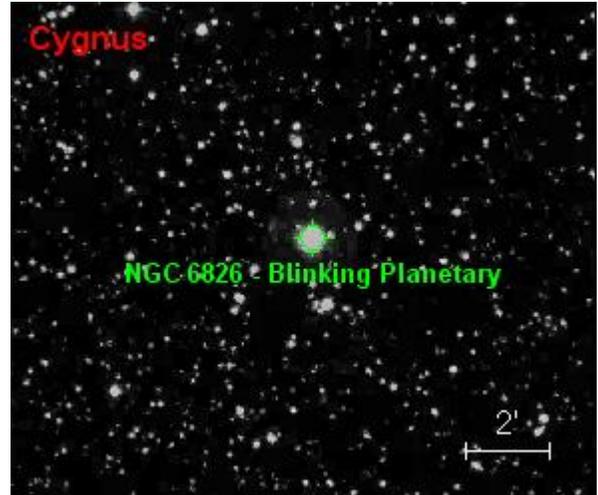


Figure 17: The Blinking Planetary



Figure 18: NGC 6826 Image contributed by John Graham

NGC 6826 is often called the blinking planetary, and for good reason. In smaller apertures, I find the shell seems to blink on and off when switching between direct and averted vision. This curious effect can keep me entertained for entirely too long. To see what I'm talking about, use a moderate power (I find for smaller apertures 100x or so works) then glance away from the nebula and view it with averted vision. The shell will appear to swell in size. Glancing back to the

planetary and viewing it with direct vision then causes it to shrink. Planetary nebulas are one of the few objects most users will be able to see color in. I find 6826 to show a vivid shade of blue, even in scopes as small as 4".

Reader John Kocijanski writes:

*...it is neat to see the double star 16 Cygni and NGC 6826 in the same field of view. I use 16 Cygni to help locate it. Once I find the double finding the planetary is easy. That planetary just floats in a sea of stars.*

### NGC 7026 – The Cheese Burger Nebula

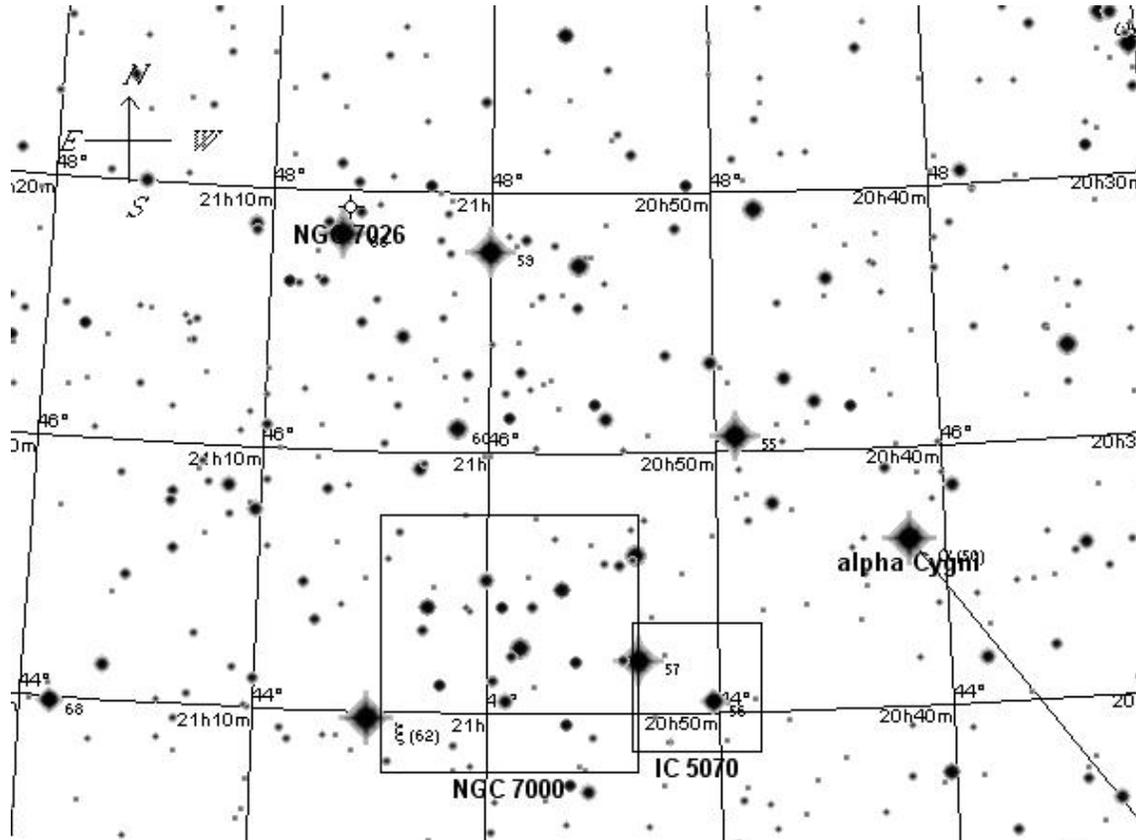


Figure 19: Area map of NGC 7026

I found this to be an odd little planetary nebula. It's non-stellar at lower powers than I expected, and appears a bit extended even in small scopes. When viewed with a large telescope at high powers, it's obviously bi-polar with one lobe being much brighter than another.

Curiously, an observing partner and myself noted a dark rift running just off center of the planetary in my 18" telescope at moderate power, but when we increased the magnification, the line appeared to vanish. I've pushed the magnification on this little guy up to around 800x (and beyond) with no sight of the mag 14.2 central star. I suspect that the internal nebulosity of the planetary tends to mask it. I'd be most interested in hearing from anyone who has actually seen it.

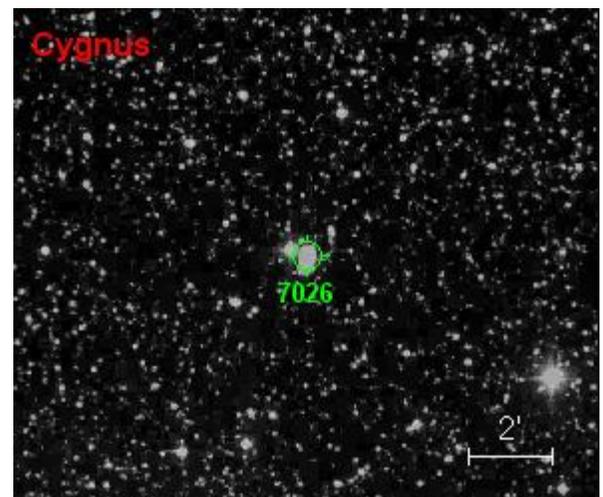


Figure 20: NGC 7026 (DSS)



Figure 21: NGC7026 - Image contributed by John Crilly

Visually, it does not look much like a cheeseburger, but through the eyes of a CCD – well, judge for yourself.

While we're talking planetary nebula and Cygnus, you might want to take a minute and visit NGC 6894 as well. This 40" planetary resembles a mini-M57 when viewed through a moderate aperture telescope.

**NGC6946**

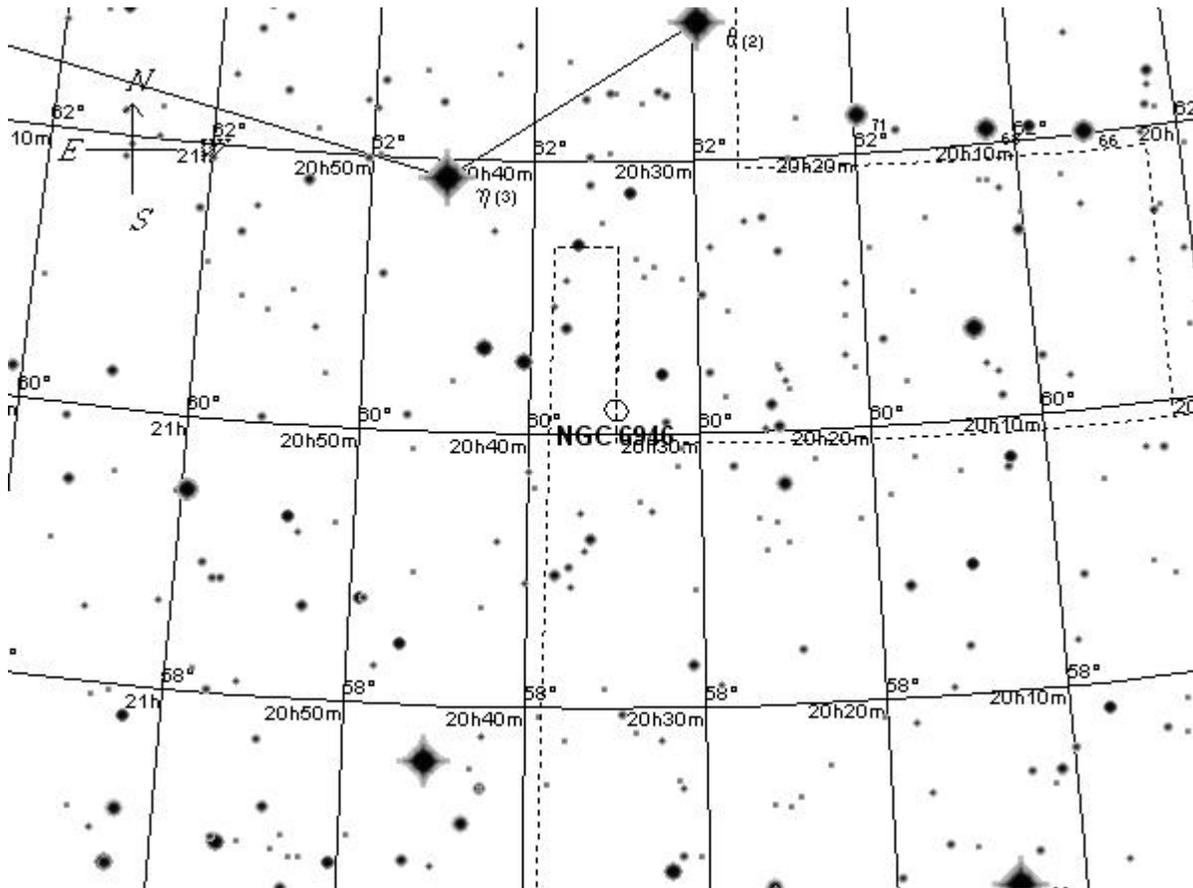


Figure 22: Area map of NGC 6946

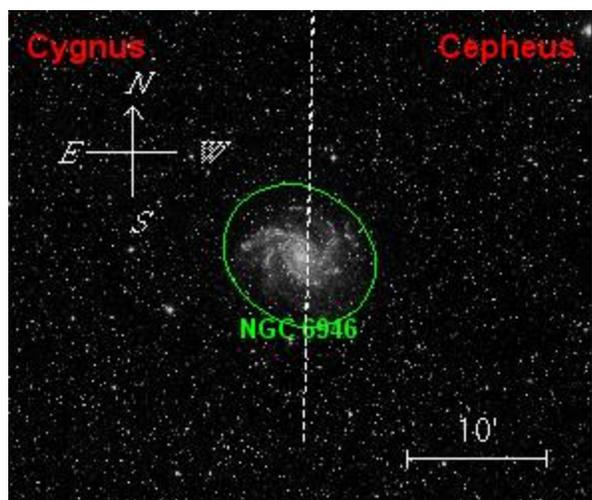


Figure 23: NGC 6946 (DSS)

Cygnus truly has one of everything – maybe. Galaxies are rare in this area – the collection of gas and dust in the arm of the Milky Way tends to block just about everything extra-galactic, but 6946 makes it through. On the far northern border of Cygnus we find the spiral galaxy 6946 - \*right\* on the border. *SkyMap* and the *Observing Handbook and Catalog of Deep-Sky Objects* both place it in Cygnus, but the *Night Sky Users Guide* places it in Cepheus. To most of us it probably won't matter, as it's awful hard to see that dotted line running through the center of the field of view in any case. Like many galaxies, this one is typically a mere blip in smaller scopes, but does begin to show some structure in larger telescopes. If you have a 15" or larger, take the time and see if you can pick out some structure.

**Challenge Object: Campbell's Hydrogen Star (PK 64+ 5.1)**

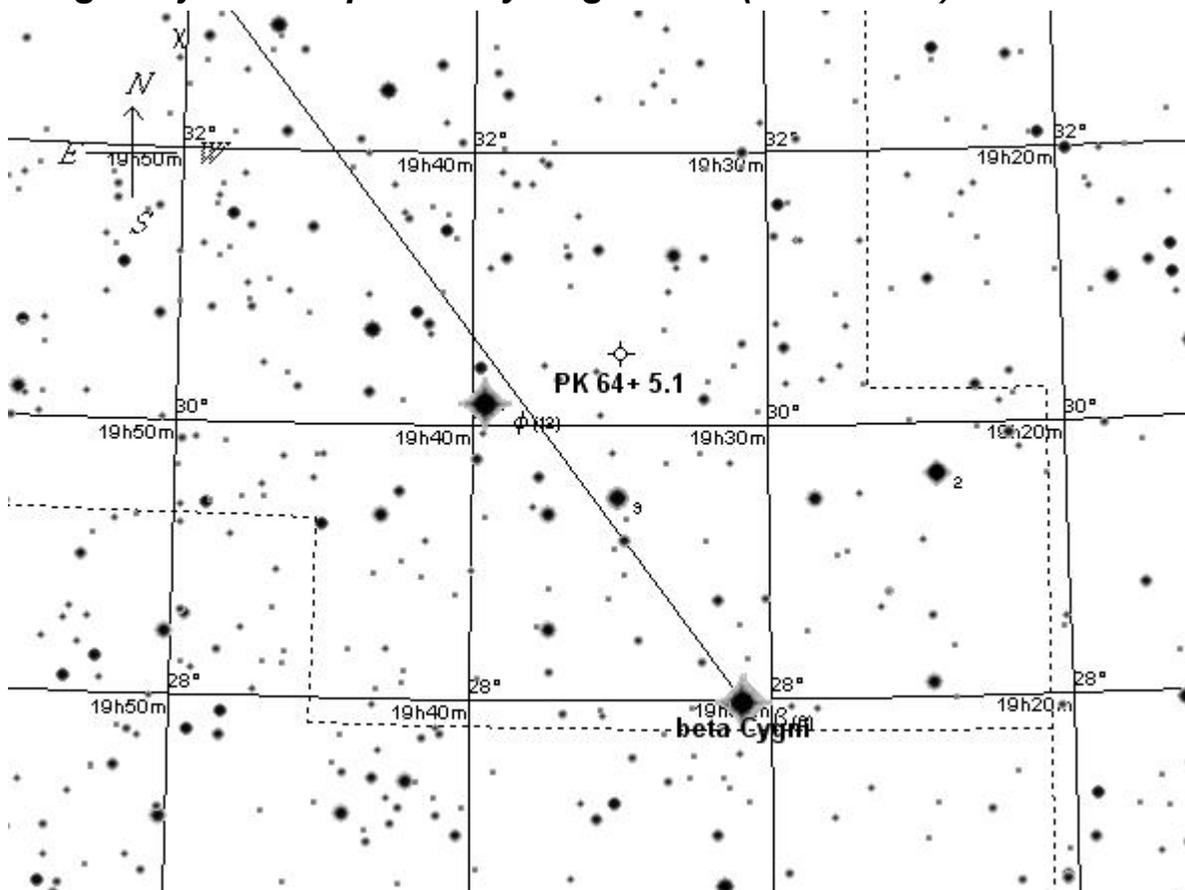


Figure 24: Area map of PK 64+ 5.1

This one is, well, honestly, I'm not sure what it is. It used to be considered a planetary nebula, but if it is, it's an odd one. I'm not positive the camp that thinks it shouldn't be classified as a planetary has figured out exactly where it should be put yet either. Some of the best guesses seem to class it as a Wolf-Rayet star with a shell. Confused? That's ok, so is it.

Whatever it is, it bears a look – not only for its name, but for the rare chance to see red in the night sky. Thanks to Brian Skiff, at least the history of this object is a bit clearer – although it was first brought to the communities attention by Campbell in the 1890's, it was actually discovered via a series of plates by Williamina Fleming working at Harvard.

Even at high powers, it's nearly stellar, and although it's an easy catch (if you know exactly what you are looking for) it's admittedly visually non-interesting in small apertures. In larger scopes, look for a reddish tint and a very small extension. It looks stellar at all but the highest powers, and does not respond well to OIII or UHC filters (unlike typical planetary nebulae). There are reports of H-Beta filters being used to some success.

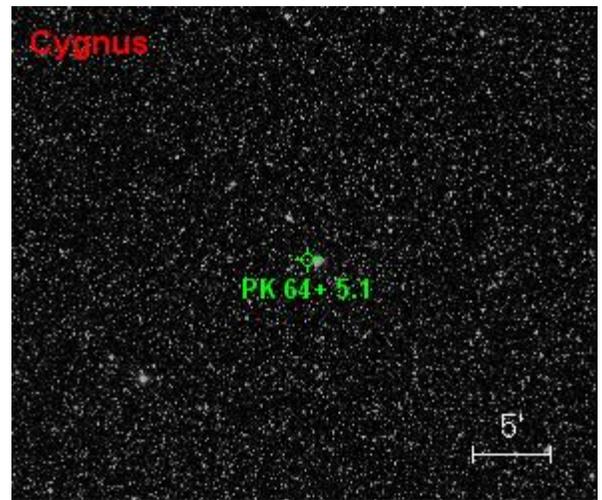


Figure 25: PK 64+ 5.1 (DSS)

In order to spot this one, you'll need to have some good charts in the field.

### **Bonus Challenge Object: SH2-112**

I'm throwing this one out for all you jaded folks who've seen the Messiers 1,000,000 times, worked your way through both the NGC and the IC, knocked off the Palomars and the Hicksons and want something a little more unusual. With that in mind, it wouldn't be any fun at all if I told you what it was or where to find it, or how difficult a catch it might be, now would it?

If and when you DO observe this one, please be sure to drop me an e-mail and let me know.

### **Additional Reading/Resources/Entertainment:**

- o Stars! - <http://www.astro.uiuc.edu/~kaler/sow/sowlist.html>
- o Night Sky Observers Guide – Kepple and Sanner
- o The Caldwell Objects – Stephen James O'Meara
- o Observing Handbook and Catalog of Deep-Sky Objects – Luginbuhl and Skiff
- o The Aintno 100 - <http://www.angelfire.com/id/jsredshift/aintno.htm>

*I'd love to hear of your experiences under the night sky - please feel free to e-mail me or send any observing reports to: [tomt@cloudynights.com](mailto:tomt@cloudynights.com)  
Please indicate if I can cite your observations in future columns.*

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