

## Small Wonders: Quick Peeks - Cepheus

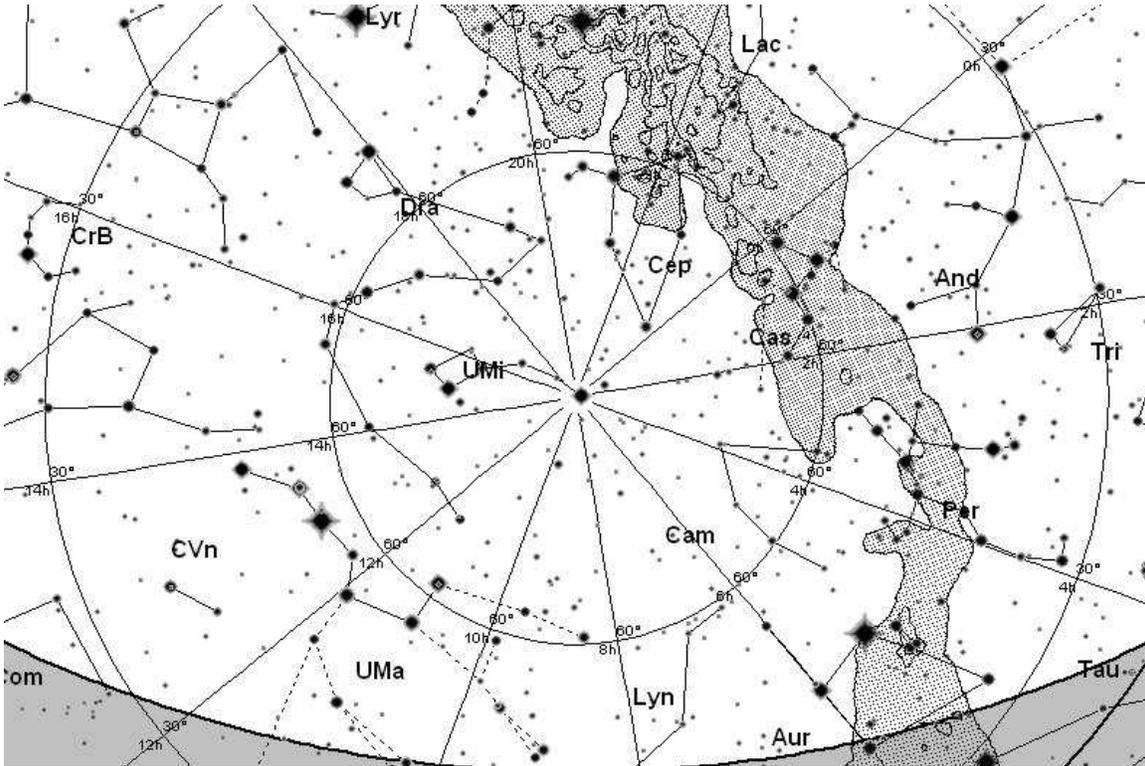
Tom Trusock 10/08



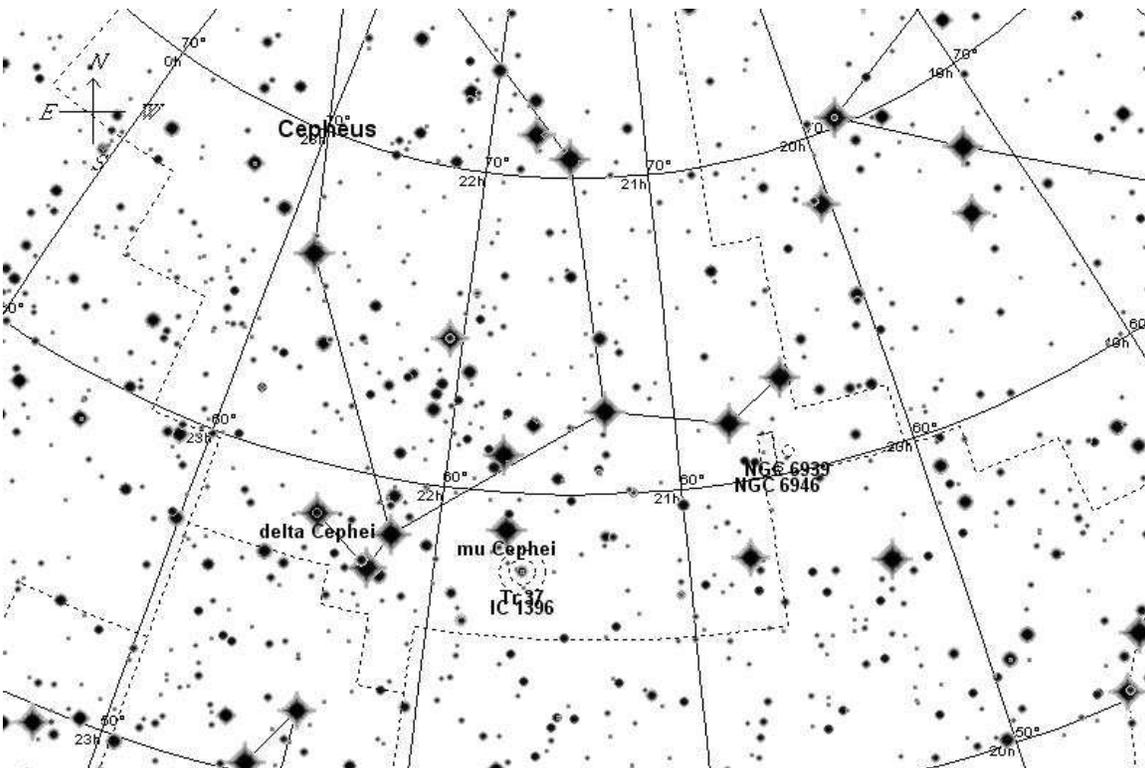
***Whaddya mean you can't see a king? Here's the king, his wife and their pet lizard too. Well, his head anyway.***

High overhead in the autumn sky lies one of the most impressive stars and star forming regions in the galaxy. Both are located in the constellation of Cepheus (the king) which is bordered by Cygnus and Cassiopeia (among others). Cepheus is relatively easy to locate with its brightest stars forming a the rather distinctive shape of a child's house.

To the south of Cepheus, we find the huge stellar nursery IC 1396. At around 2.5 deg by just over 2 deg, this HII region is one of the largest star forming regions in the night sky and occupies around 16 times the area of the full moon. IC 1396 lies some 3000 light years from your backyard - and perhaps only slightly further from mine ;) - on any given night and contains a number of targets in its own right. This area is packed with deep sky objects. You'll find the Elephant's Trunk Nebula (IC 1396a), the open cluster Trumpler 37, the dark nebulae B161, B367, B163, B162, B160, and B365, various multiple stars, and perhaps most impressive of all, Herschel's Garnet Star - the Variable Mu Cephei - in the region.



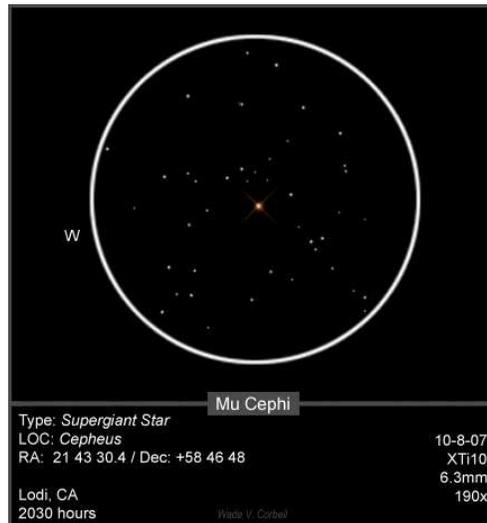
**Wide field Finder Chart, Facing North - about 9:30pm Early October**



**Targets of Interest**

And speaking of Mu, that's a good place to start. One of the most distinctive stars in the night sky, Mu (sometimes called Erakis or Herschel's Garnet Star) is located just south of a line connecting the base of the house - stars Alpha and Zeta which are mag 2.43 and 3.44 respectively. Interestingly, Alpha is bright because it is relatively nearby at a mere 49 light years while Zeta lies around 730 light years distant.

Mu can be caught with the naked eye, but its orange golden color is quite obvious with only the smallest optical aid, and it's a very easy catch while scanning.



**Mu Cephei - Digital Sketch WadeVC**

Mu is a red hypergiant, at some 1650 times the diameter of the sun, it's one of the largest and brightest stars in the Milky Way (as of this writing, apparently only around five larger are known to exist). Mu is also variable, in fact it's the prototype for its class. Its magnitude varies from 3.43 to 5.1, and its period is somewhere around 800-850 days (there is some evidence for it having an additional period of around 4400 days as well). Its distance is somewhat uncertain, but if it's part of the Cepheus OB2 stellar association, it could lie around 2400 light years away. Mu is one of the few stars whose disk actually has an appreciable and measurable diameter. If Mu were to replace the sun, its surface would lie between Jupiter and Saturn.

Mu is reaching the end of its life, and has probably ceased its hydrogen fusion stage although we can't be certain of its internal status. According to Jim Kaler - Professor Emeritus of Astronomy, University of Illinois - "Odds are it is now fusing its core helium into carbon." Someday (no, we don't have a clue when), Mu will go out in a spectacular supernova.

So I guess the point here is to enjoy Mu while it lasts.

South of Mu lies the star birth region IC 1396 (also known as Sharpless 2-131). Indeed, long duration photos show Mu to lie on the very edge of 1396.

From a dark site, scan just to the south with a rich field instrument (high power binos or a wide field refractor are preferred) to locate the giant HII region. It's rather easily seen in my 15x50 binoculars and somewhat resembles a large face on spiral like M33. I was easily able to map a portion of it about 1-1.5 degrees in diameter - averted vision helps. I find the surface brightness to be on the same order as portions of M33 or the very outer edges of M31. You'll have a difficult time with lower power binoculars because as the magnification drops, so does the contrast between the target and the sky. Don't let this keep you from trying however. I've heard claims it's been caught with the naked eye from a suitably dark and transparent site. Because of its large and diffuse nature tho, you probably won't be able to see much, if anything, of it through larger instruments. This is one target you really want those wide field views for.



**IC 1396 - Courtesy Eric Africa (SII mapped to Red, H-Alpha to Green, OIII to Blue)**

Steve Coe's notes drive this home as he writes:

*IC 1396 10" f/5 triple star and 22 stars counted, one long chain and 12 other stars. Extremely faint nebula to east of cluster, just seen without UHC, better with the filter, but still faint.*

*IC 1396 6" f/6 Maksutov-Newtonian See=6, Ttransp=8 35mm+UHC Very faint, very, very large, irregular figure, brightest on north side. This nebula has a very low surface brightness.*

*IC 1396 6" f/8 S=6, T=8 35mm and UHC filter shows a huge field of nebulosity that is pretty faint, extremely large and diffuse.*

There are several regions inside IC1396 that are probably more of interest to photographers than visual observers. The most famous is a globule named IC1396a, also known as Van den Berg (VdB) 142 – or the Elephant's Trunk Nebula. IC 1396a is most likely a stellar nursery containing young stars (less than 100,000 years old). In the image below, you can see some stars in the tip - their solar pressure has had time to hollow out a cavity signifying that these are probably the more ancient of their brethren in IC 1396a - perhaps up to 10 times the age of their siblings - still young by stellar standards.



*IC 1396a - Courtesy Jacob Bassøe (From Copenhagen, Denmark)*

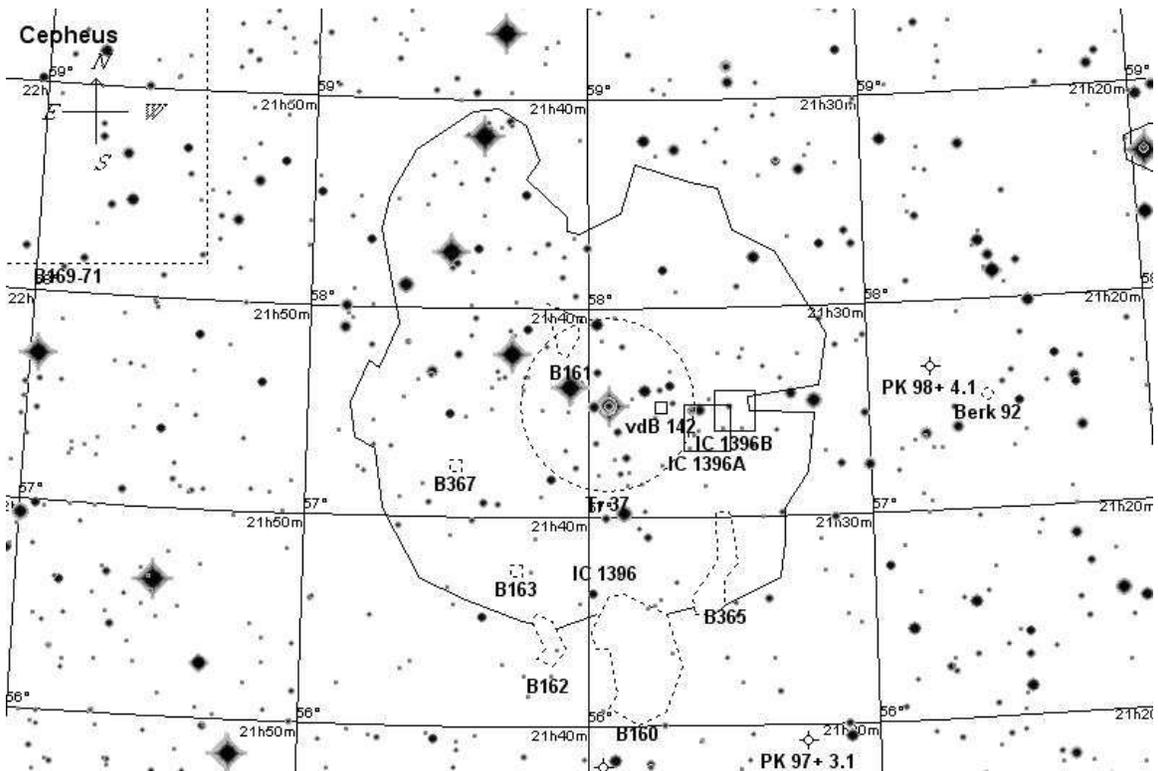
At the center of IC 1396, we find a small open cluster visible through binoculars or small telescopes – Trumpler 37. Take a few moments and count how many stars seem to be associated with it. I find it difficult to get an exact count because of its location in the Milky Way. More aperture brings out more background stars, and I can't seem to figure out what's in the cluster and what isn't. Regardless, it's a pretty view.

The finder chart below shows the IC1396 region complete with several of Bernard's Dark Nebulae. Dark nebula show themselves by blocking the view behind. One of the more distinct dark nebulae in this complex is probably B163. Take a moment and see if you can see it blocking out the background glow of the emission nebula. Most likely you won't be able to spot in a typical set of binoculars, and I'm betting that you may need to use a UHC filter – but you'll never know till you try.

You'll probably note that I've left a couple of other objects on the charts - these are also good selections for a small telescope, but I can't have all the fun. I'll leave you to do your own research. :)



IC1396 Region in Cepheus - Note Tr 37 at the Center. Image Courtesy Hunter Wilson



And with that, that's it for this one. Once again, thanks to the readers who submitted observations, sketches and photos, there were far more excellent submissions than I could use. Your contributions greatly enrich these articles.

As always, I'm gratified if folks find my meanderings useful.

Till next time -

-Tom T.

## **Additional Resources / References / Just Plain Cool Stuff**

### **Mu Cephei - From Jim Kalers STARS**

<http://www.astro.uiuc.edu/~kaler/sow/garnet.html>

### **Wikipedia: Mu Cephei**

[http://en.wikipedia.org/wiki/Mu\\_Cephei](http://en.wikipedia.org/wiki/Mu_Cephei)

### **AAVSO Variable Star of the Month**

#### **October 2002: Mu Cephei**

<http://www.aavso.org/vstar/vsots/1002.shtml>

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[http://www.cloudynights.com/category.php?category\\_id=170](http://www.cloudynights.com/category.php?category_id=170)

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) (remove the \_ and please contact me via Forum PM if I don't respond. I've been having some issues with spam lately, and probably didn't receive your e-mail.)

Please indicate if I can cite your observations in future columns.

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