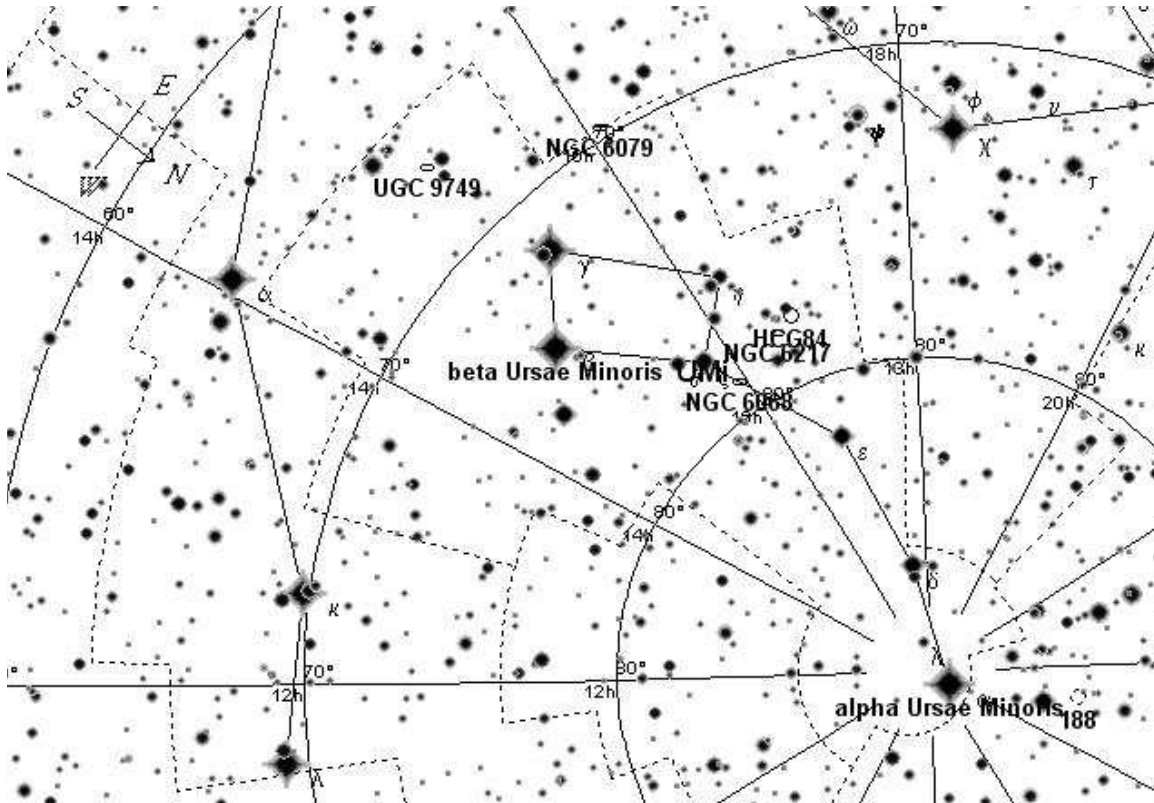


# Small Wonders: Ursa Minor

*A Monthly Guide to the Night Sky*

*by Tom Trusock*



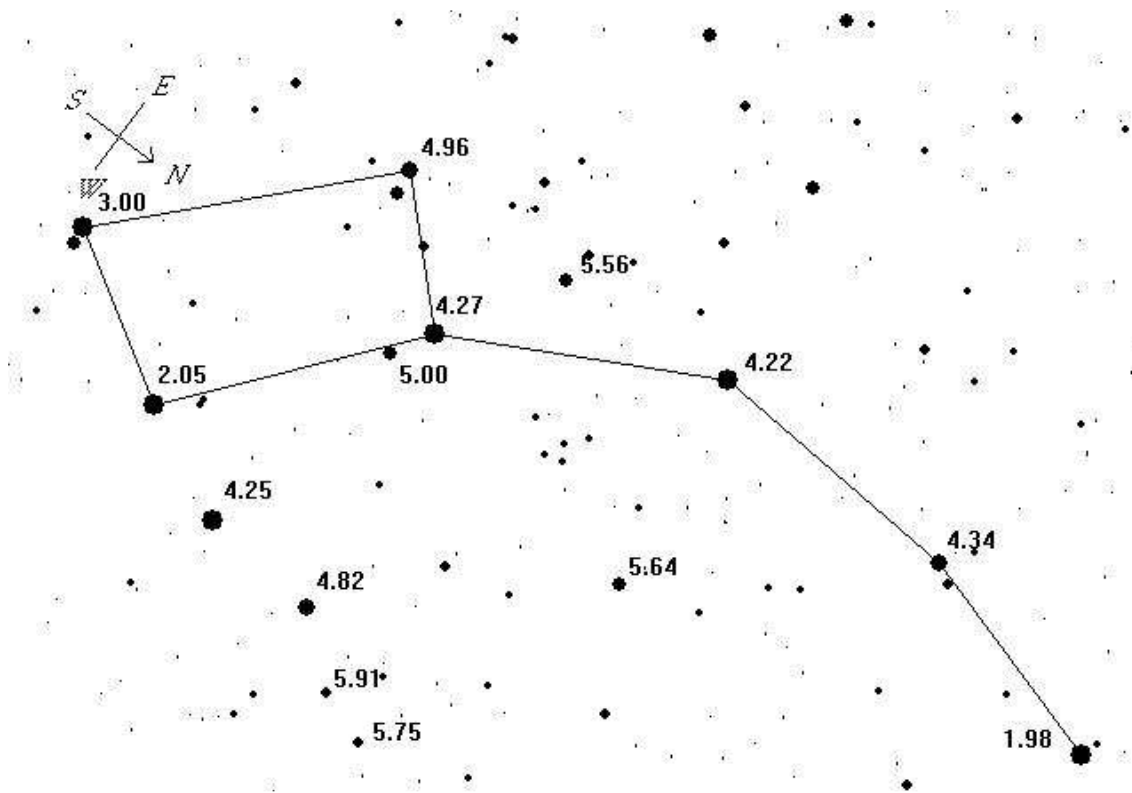
Wide field Chart

<b>Target List</b>	<b>Name Type Size Mag RA DEC</b>
	alpha Ursae Minoris Db St 2.0 02h 36m 49.6s +89° 17' 03" (Polaris)
	beta Ursae Minoris St 2.1 14h 50m 45.3s +74° 08' 12" (Kochab)
	The Engagement Ring Asterism 02h 36m 49.6s +89° 17' 03"
	NGC 6068 Galaxy 1.0'x0.7' 12.4 15h 55m 16.3s +78° 59' 00"
	NGC 6217 Galaxy 3.0'x2.5' 11.0 16h 32m 29.2s +78° 11' 22"
NGC 3172 Galaxy 1.0'x0.7' 14.4 11h 48m 00.8s +89° 04' 07"	
<b>Challenge Object</b>	<b>Name Type Size Mag RA DEC</b>
	HCG84 Gal Clu 14.7 16h 44m 14.8s +77° 47' 29"
	UGC 9749 Galaxy 27.3'x16.0' 10.9 15h 08m 54.6s +67° 10' 57"

Ursa Minor is probably one of the best known asterisms in the entire sky. Nearly everyone has heard of the "Little Dipper", but ironically, among non astronomers, it's also

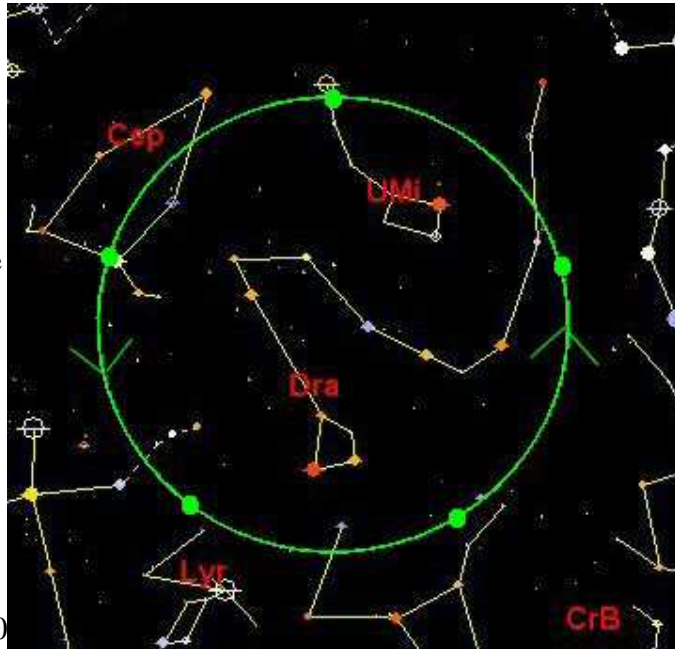
probably one of the most misidentified groups of stars in the night sky. While many realize that the front/pointer stars of the Big Dipper (recognized the world over) point towards Polaris, many non astronomers who look up still manage to link the "little dipper" with M45 - the Pleiades. The true little dipper's origins are somewhat shrouded in mystery, but there's evidence that it was handed down to us from the greeks sometime prior to the 3rd century BC. There's also some speculation that it may even be a more recent creation formed from stars that marked the wings of Draco.

Although it's somewhat barren of deep sky objects, this area is of interest in and of itself as a measure of sky conditions. While I've found NELM (Naked Eye Limiting Magnitude) to vary across different portions of the sky, I glance at Ursa Minor for a quick check every night. The stars that trace out this asterism vary fairly evenly from magnitude 2 to magnitude 5, and offer a quick estimate to local sky conditions. While the dipper typically stands out well from my rural home, moonlight or haze can easily reduce my NELM. If only a few stars are visible in the dipper, I know I have to revise my deep sky expectations for the evening. This is a great (and easy) way to gauge your local skies.



The most famous star in the night sky is arguably Polaris - the North Star. For most of recent recorded history, Polaris has been known to the world as the star that points the way. It's had many names, and the database in SkyMap Pro lists more than a few: Alruccabah, Cynosura, Phoenice, Lodestar, Pole Star, Tramontana, Angel Stern, Navigatoria, Star of Arcady, Yilduz and Mismar. Polaris or (ok, one more) Alpha Ursae Minoris, while more accurate than a compass actually lies around 3/4 of a degree away

from the showing true north. Not only that, but the relationship between North and the North Star is constantly changing. Because of a phenomenon known as precession, (basically a wobble of earth along it's axis - much like a top) the northern pole carves out a 47 degree diameter circle on the night sky. While Polaris is currently the pole star, this hasn't always been the case, nor will it continue. If you take a look at the image to the right, you can see the circle the northern pole scribes on the night sky. The tic marks denote intervals of around 5200 years. Thus 5200 years from now, the pole star will be Alpha Cepheus - *Alderamin*, while nearly 4600 years ago (during the time of the pyramids), the pole star was *Thuban* in Draco. Precession is also the reason that stellar atlases and their coordinate systems are dated - most commonly either 1950 or 2000. Today, Polaris is at 90 degrees declination (well 89 degrees 15 minutes anyway) and *Alderamin* is at 62.5 degrees declination. In 5000 years or so, *Alderamin* will nearly be at 90 degrees declination while Polaris will have drifted away. Polaris will continue to move closer to the pole until sometime in 2102 when it reaches it's closest approach - just under 30' - a full moon's apparent size, after which it exits, stage right. So - enjoy Polaris's tenure as the northern star while it lasts.



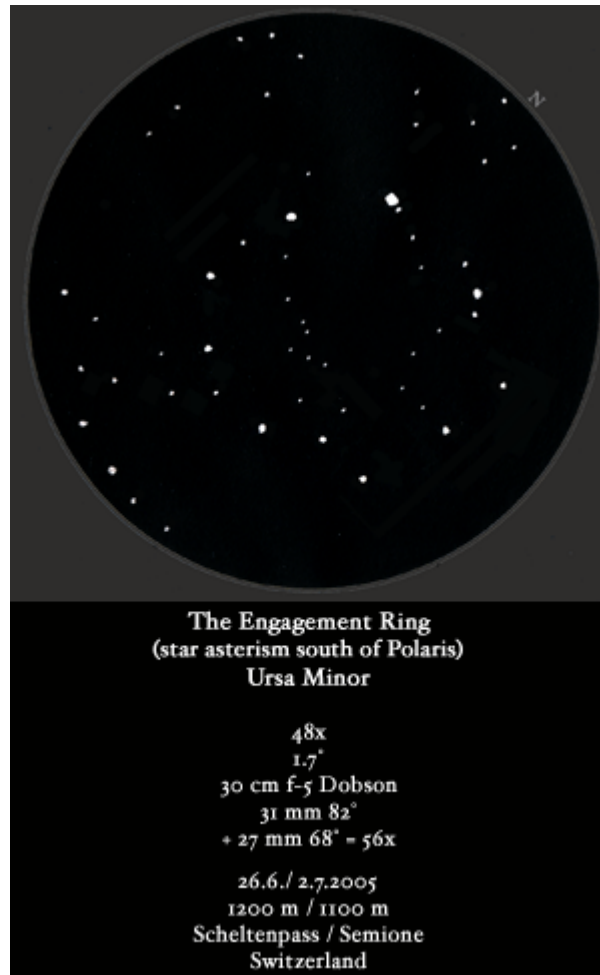
As you can see in *John Crilly's* image to the left, Polaris is also a double star. For those of us who live in the northern hemisphere, and use computer aided telescopes, this is fairly common knowledge. While I'm not much of a double star observer, Polaris is one that I check in on most clear nights as it's a very convenient alignment star.

Interestingly enough, Polaris is also a variable - albeit a very minor variable, it's variance is only around .04 mag with a period of 4 days. So, it's not really enough to notice - I suppose the simple fact serves to make it one of the few variable stars I also check in on over a regular basis.

With enough power - around 130x, I've split it in a 66mm telescope, but it's far easier in a larger telescope (moderate powers in the 18" result in an apparent separation you could drive a truck through). Visually, I find the mag 2 primary to be a pleasant golden yellow,

and the mag 9.1 secondary to be a cool white. Current separation is around 18". Because of the closeness, near fixed position in the night sky, and the rather large magnitude difference, it seems this double would be a fairly good test of optical quality in a small scope - but I don't often hear of people observing it, let alone testing their optics on it.

Polaris itself is a spectroscopic binary but hasn't been split (as far as I know by this writing) by any other source.

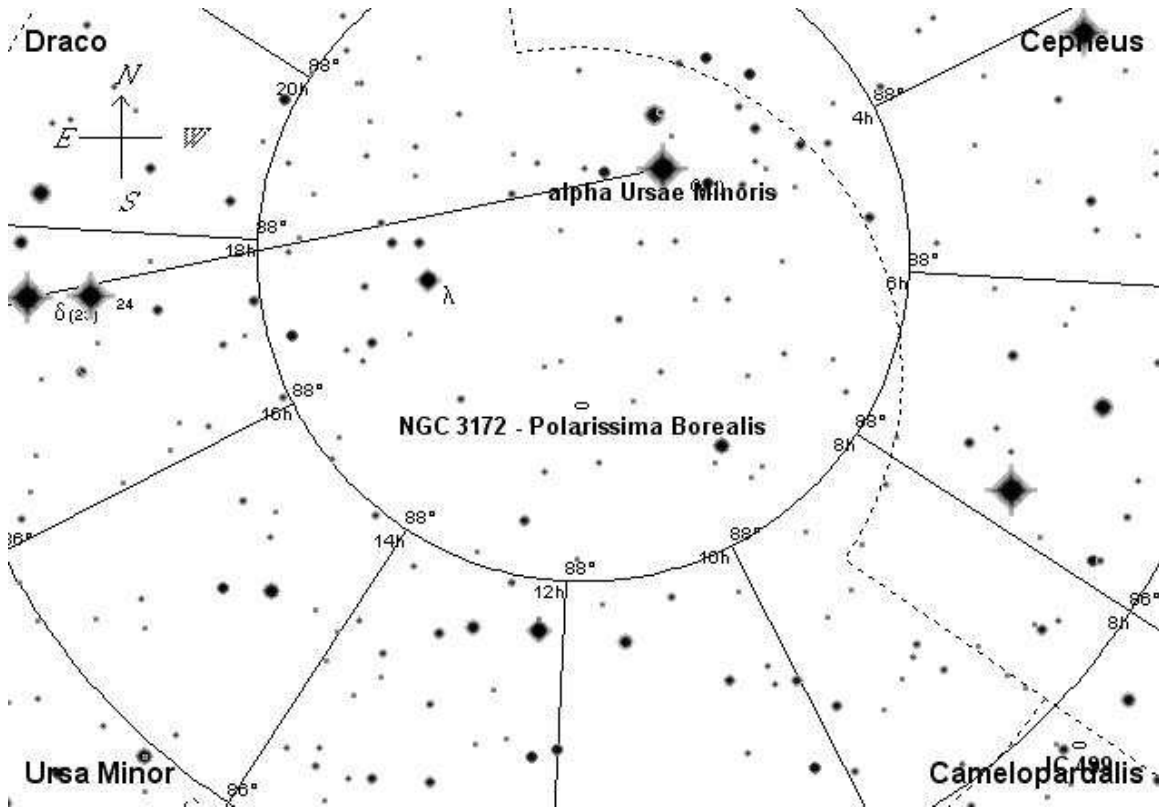


*Courtesy Swiss Astronomer Amalia*

When you're done looking at Polaris, take a minute and grab the binoculars or drop back to something that gives you a low power and a wide field of view. Welcome to the Engagement Ring. To see it at it's best, you'll need something that provides a 2 degree (or wider) field. Phill Harrington makes mention of this asterism in "Touring the Universe with Binoculars" and labels it Harrington 1, but in spite of that recent catalog designation it's been known for a long time and even appears in Burnham's Celestial Handbook. With Polaris as the diamond, it puts on it's best show in binoculars or small, wide field, telescopes, and is well worth a peek.

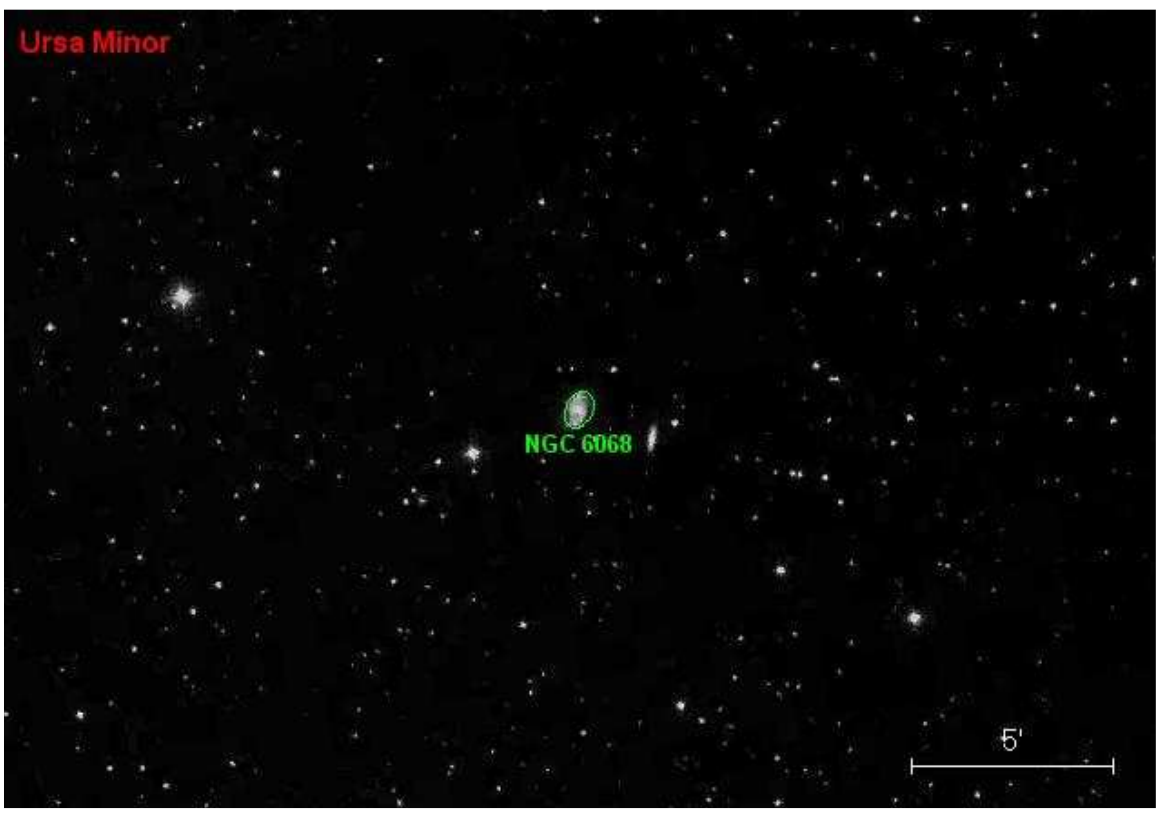
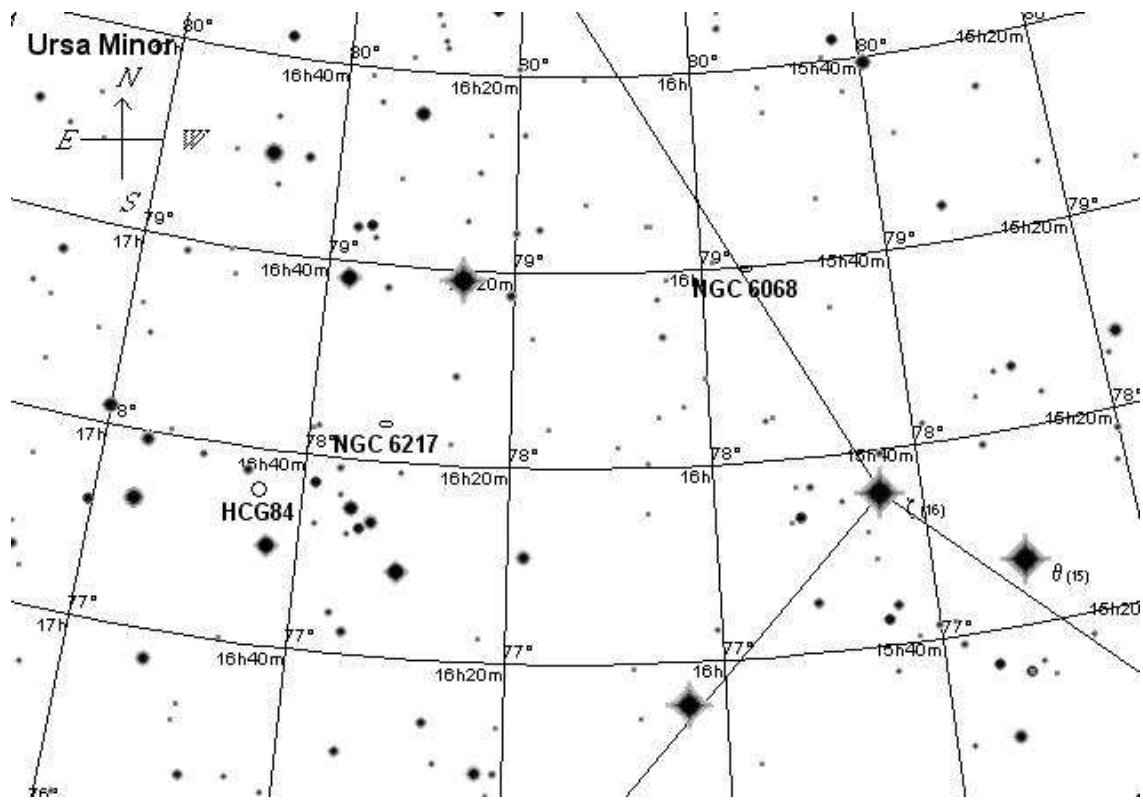
The second brightest star in UMi (beta UMi) is Kochab, and also worth a look through

your small scope or binoculars. Kochab is a double with a separation of 209". Interestingly, the name Kochab is taken from the arabic Al-Kaukab al-shamaliyy meaning "The star of the north" - a leftover from it's tenure as the pole star 3000 years ago. The primary is mag 2, while the secondary a very faint 11.4. I typically don't look at Kochab and see it as a double star, but I do find it to be a very pleasing golden color. Take a look and tell me what you see.



After you are done taking a look at the engagement ring, haul the scope out again and hop over to take a look at NGC 3172. Don't expect a lot - visually there's just not much there. From a suburban site, you'll need a bigger telescope and some luck to see anything. From a darker site, an 8 or 10" should suffice to show you a small bit of celestial fluff. The sole reason for the inclusion of this galaxy this month is not in what you can see, but in what it is - it's the closest NGC galaxy to the northern pole. This title has earned it the name Polaris Borealis. If you do manage to see it, give yourself a pat on the back. (That's something you'll hear me say at least one more time this month.)

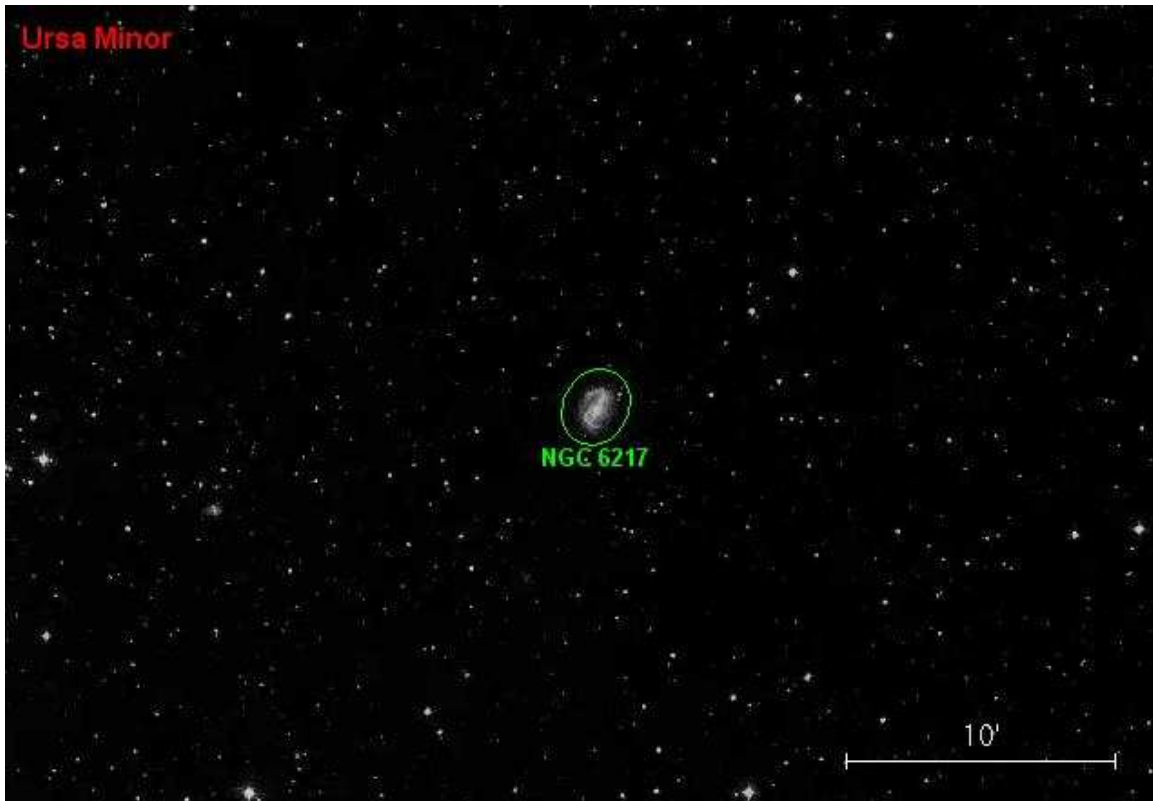
Now lets move down the dipper's handle and take a look our two other non challenge (relatively speaking - at least for larger scopes) objects for the evening:





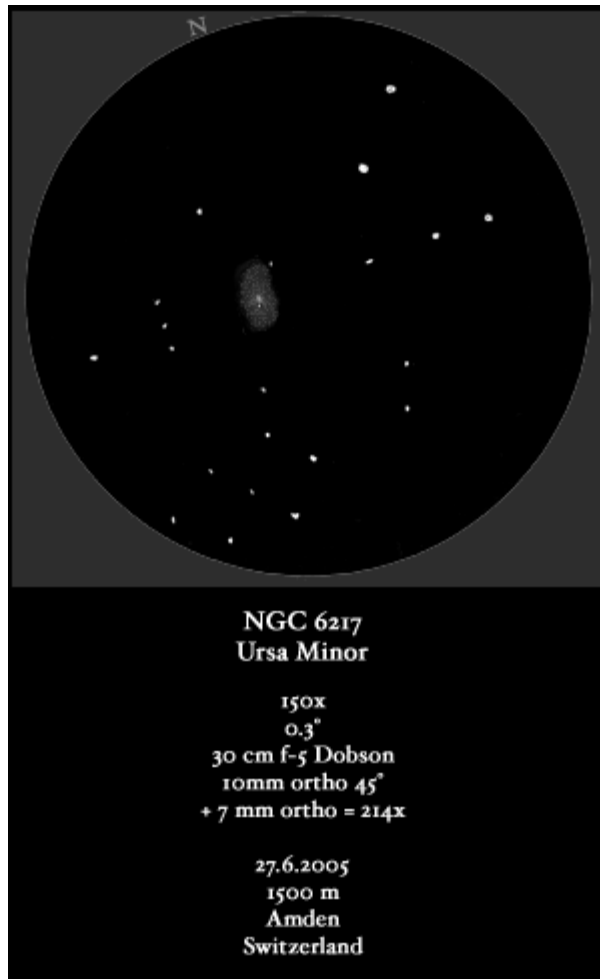
*Courtesy Swiss Astronomer Amalia*

First stop - NGC 6068. In smaller scopes, look for a faint piece of gauze, with moderately larger ones you should be able to pick out the companion galaxy - 6068a. In my 18", 6068's core stands out brightly and I can make out a diffuse outer halo.



Next up, we find NGC 6217. If I had to pick one galaxy to be the showpiece in Ursa Minor, it would have to be 6217. Ironically, this is the **only** entry for Ursa Minor in **Luginbuhl and Skiff's** *Observing Handbook and Catalogue of Deep-Sky Objects* - an excellent resource for scopes from 60mm to 12 inches. Even so, in smaller scopes I find it's decidedly less than spectacular. It's not all that difficult in an 8", and more difficult but not impossible to pull out under excellent conditions in a 4" scope . In my 18", much of the detail in the photo is visible - although it's quite a bit dimmer. At moderate powers I can see the bright star like nucleus, the central bar, and if I look carefully I even get a glimpse of wispy spiral arms.

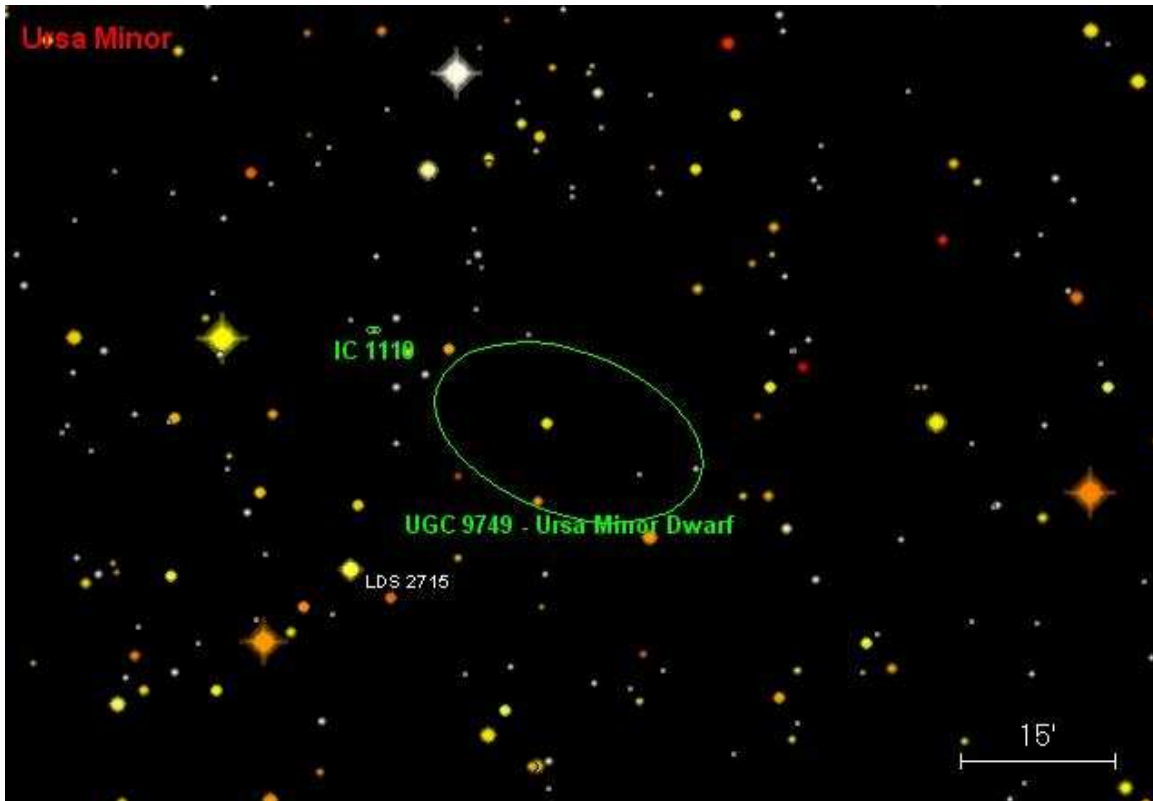




*Courtesy Swiss Astronomer Amalia*

Thus ends the "easy objects" for the month - on to the challenge targets.

This month, we have two.



The first, and easiest, is UGC 9749 - the Ursa Minor Dwarf galaxy which is a "nearby" member of the local group and a satellite of our own Milky Way. At a listed visual magnitude of 10.9, you'd think it would be an easy target.

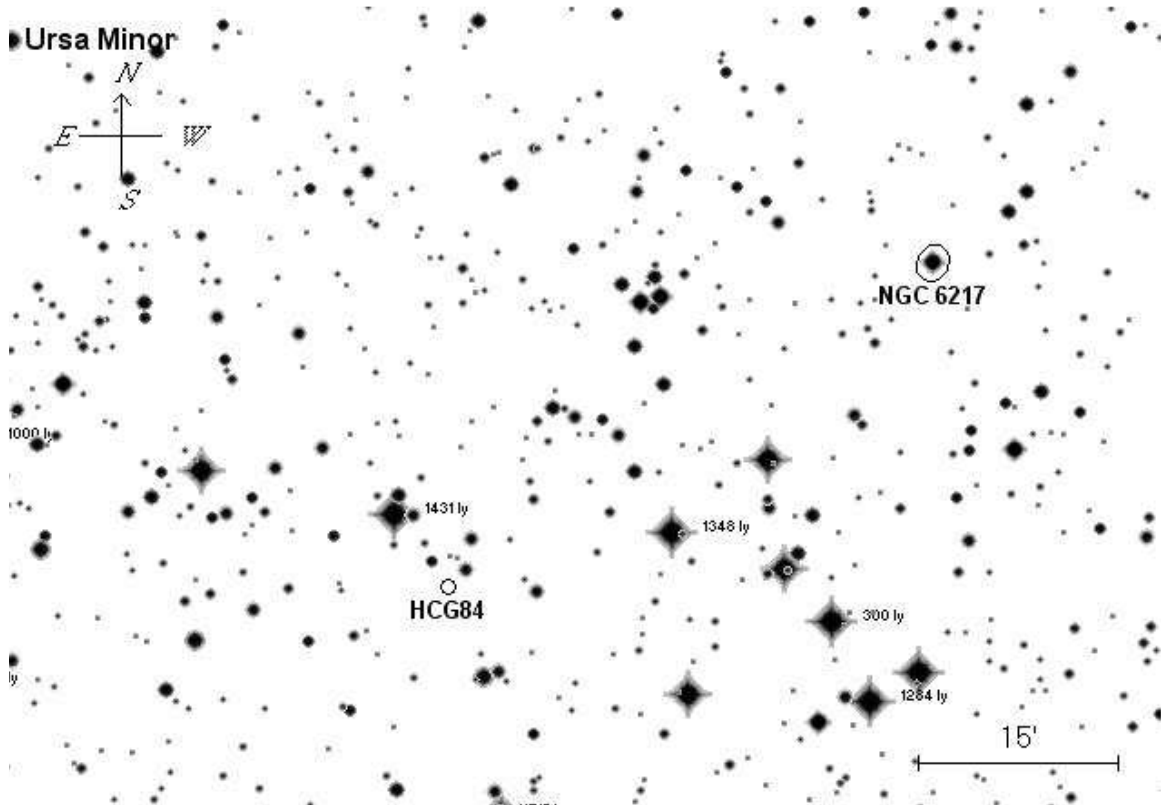
You'd be wrong.

UGC 9749 is an exercise in the importance of understanding the concept of surface brightness. The magnitude typically listed for any object is its integrated magnitude (either visual or photographic). A simple way to think about the integrated magnitude is to imagine that object collapsed down to a point - that, then, would be its magnitude or brightness. If it's a small object, the listed magnitude is often a good indicator of how easy the target is to spot. For large extended objects, it's admittedly less handy. A better indicator of an extended objects visibility is surface brightness - the measure of an objects brightness per unit area - typically expressed as magnitudes per square arc minute or arc second.

One source puts UGC 9749's surface brightness at 17.8.

I was unable to find confirmation of this, but suffice it to say given it's 41x26 arc minutes in size (that's right - arc minutes, not seconds) that mag 10.9 is spread out over a LARGE area. This dwarf elliptical or spheroidal galaxy is relatively near by at a distance of around 240,000 light years. It was discovered in 1954 by A. G. Wilson on the Palomar Deep Sky Survey. Ironically, the dwarf did NOT show well at all on the digitized DSS images I had access to - thus, no picture.

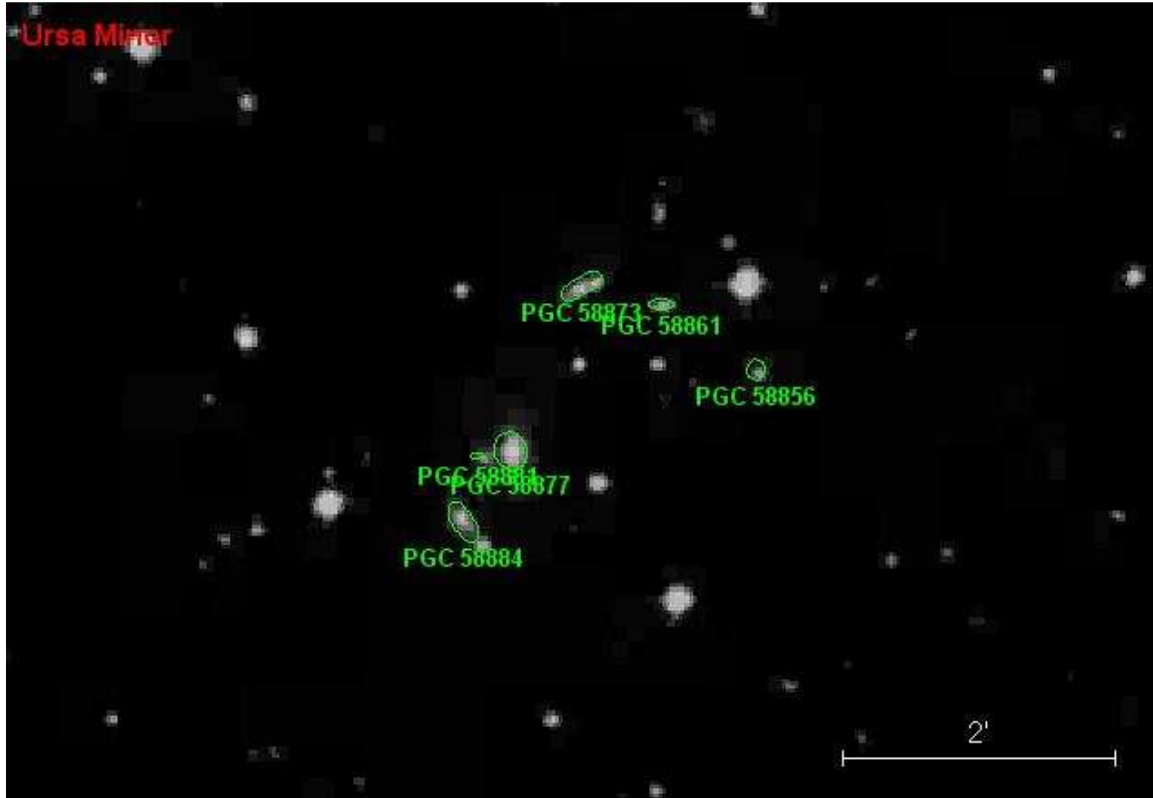
The trick to finding it is to scan the area at low but increasing powers with the largest scope at your disposal. Keep your fields as wide as you can - remember in it's entirety this object is larger than the full moon. Don't look for a typical galaxy - rather (and like Bernard's Galaxy we discussed last summer) look for a general brightening of the sky background. From my rural site, this is visible in my 18" as a general granular brightening of a very large section of the sky. I have to pan around to discover the edges of the dwarf. Don't dismay, smaller telescopes have picked it up, I've seen at least one reference to it being spotted with a 13" under dark skies.



Finally, our last object for the month should prove to be a challenge even for observers with large scopes.

For a while now, you may have noted I've been throwing objects from Paul Hickson's *Atlas of Compact Galaxy Groups* in as challenge objects. Since the catalog came out in 1994, observers with large scopes have been knocking targets off the list, and it's one I've gleefully attacked with everything at my disposal. I think it's popular with deep sky observers for several reasons; 1) it's a finite list - there are a total of 100, so it's quite manageable in size, 2) many of the items are quite popular showpieces - galaxies that are apparently interacting - especially when there are several in a very small slice of the sky are always visually interesting, and 3) most of them are in the visual reach of an observer who has access to fairly dark skies and a decent sized scope. Perhaps the best known Hickson is HGC92 - Stephan's Quintet, but some of the others certainly aren't strangers - Copeland's Septet, Seyfert's Sextet and The Box are also popular with stargazers and at

least heard of by many who have spent time dreaming about the realm of galaxies..



Hickson 84, isn't big, bright or well known. In fact, bluntly put, it's not even all that visually interesting. It is, however, intriguing for at least two reasons. First, it's the only Hickson in Ursa Minor (which as we've seen is something of a barren constellation anyway) and secondly, at integrated magnitude 14.7, it's not one of the brighter Hicksons so it's something of a challenge even for an 18" scope under decent skies.

A challenge is a good thing.

While there are six members to the group, I was only able to snag the three largest and brightest; PCG 58884 (mag 16.4), PCG 58877 (mag 14.63), and PCG 58873 (mag 15.13) with my 18" from my backyard in Michigan's lower peninsula. Using charts I located the general area at 200x, but could see nothing. I kept increasing the power and finally got to 400x where these three popped out of the background, and I was able to confirm them lying in a line that heads SE to NW.

If you manage to grab these, give yourself a firm pat on the back.

**Additional Reading:**

Precession of the Earth - by Dr Jamie Love

<http://intranet.rocklizard.org/astronomyclass/precess.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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