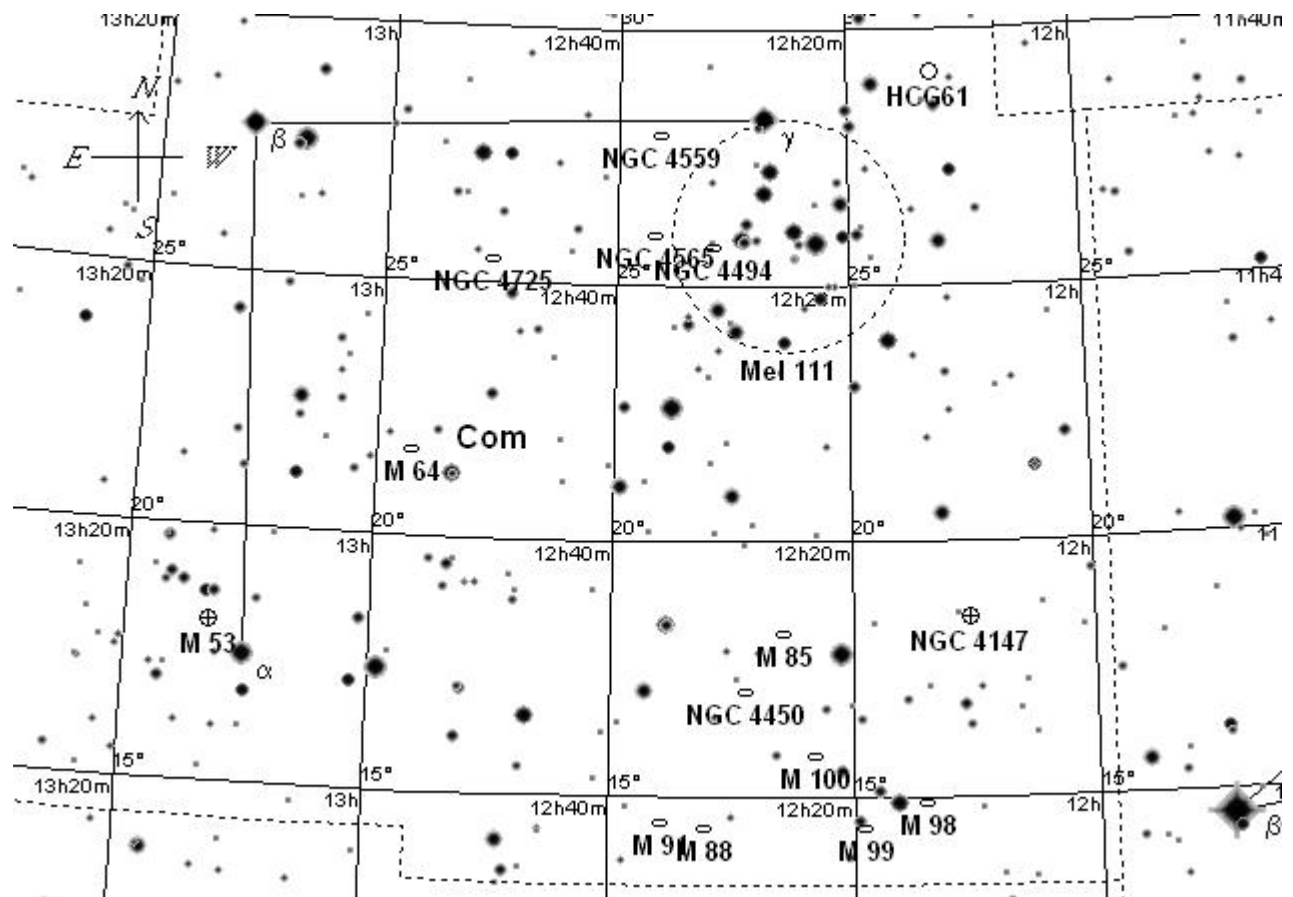


Small Wonders: Coma Berenices

A Monthly Guide to the Night Sky

by Tom Trusock



A PDF will be Available Soon

Wide field Chart

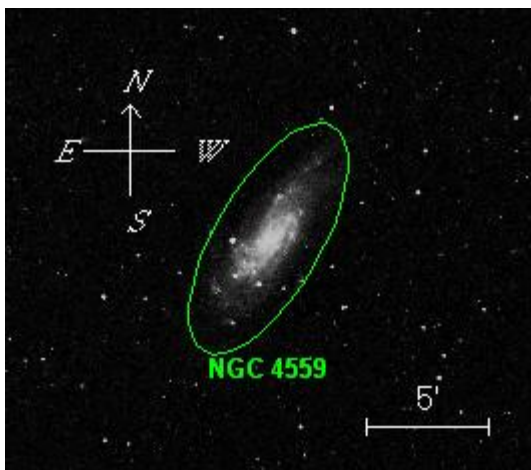
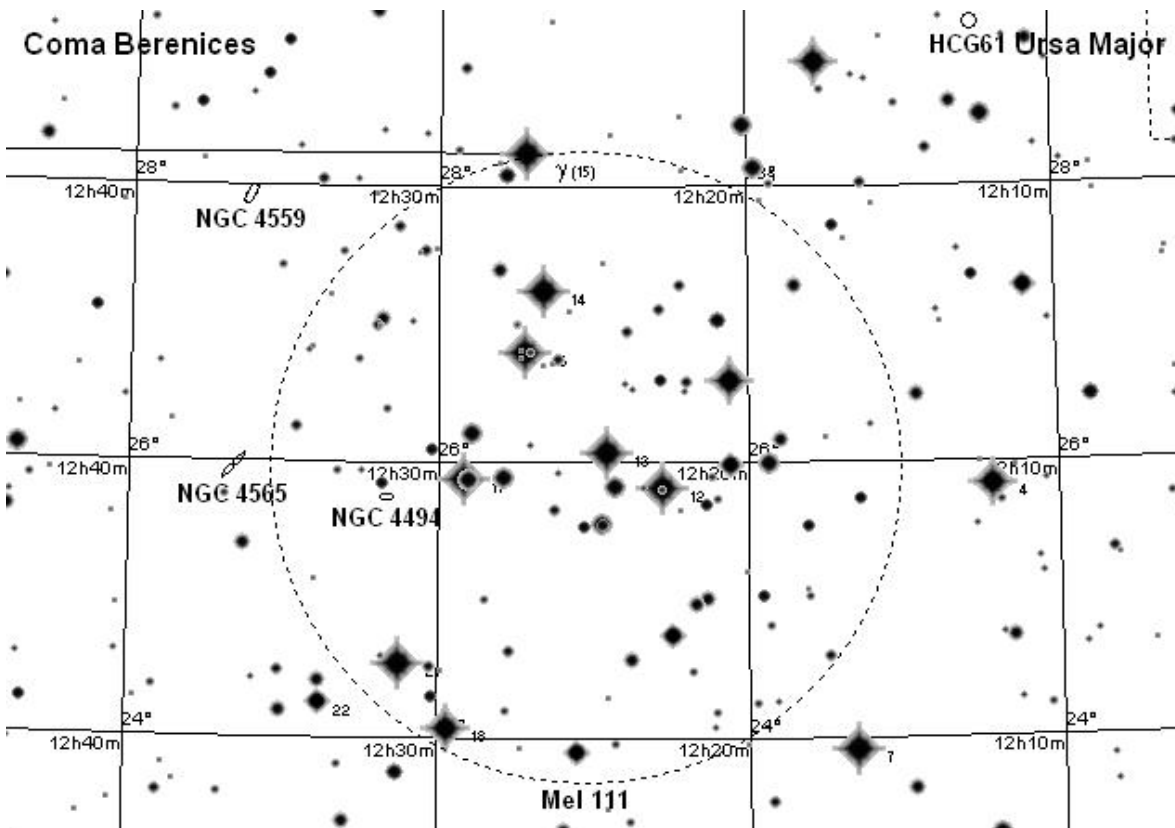
Target List	Name Type Size Mag RA DEC
	Mel 111 Open Cluster 275.0' 1.8 12h 25m 17.0s +25° 58' 15"
	M 53 Globular 13.0' 7.7 13h 13m 11.9s +18° 08' 26"
	M 64 Galaxy 10.0'x5.4' 8.5 12h 57m 00.5s +21° 39' 13"
	M 85 Galaxy 7.1'x5.5' 9.1 12h 25m 40.9s +18° 09' 40"
	M 88 Galaxy 6.8'x3.7' 9.4 12h 32m 15.9s +14° 23' 23"
	M 91 Galaxy 5.2'x4.2' 10.1 12h 35m 43.3s +14° 27' 59"
	M 98 Galaxy 9.8'x2.8' 10.1 12h 14m 04.8s +14° 52' 11"
	M 99 Galaxy 5.3'x4.6' 9.7 12h 19m 06.3s +14° 23' 15"
	M 100 Galaxy 7.5'x6.1' 9.3 12h 23m 11.9s +15° 47' 35"
	NGC 4147 Globular 4.4' 10.4 12h 10m 23.3s +18° 30' 47"
	NGC 4450 Galaxy 5.4'x4.1' 10.1 12h 28m 46.2s +17° 03' 16"
	NGC 4494 Galaxy 4.8'x3.5' 9.7 12h 31m 41.0s +25° 44' 46"
	NGC 4559 Galaxy 10.7'x4.4' 9.6 12h 36m 14.7s +27° 55' 50"
	NGC 4565 Galaxy 15.8'x2.1' 9.5 12h 36m 37.4s +25° 57' 31"
	NGC 4725 Galaxy 10.7'x7.6' 9.3 12h 50m 43.2s +25° 28' 15"
Challenge Object	Name Type Size Mag RA DEC
	HCG61 Galaxy Cluster 12.6 12h 12m 35.2s +29° 10' 16"

Coma Berenices. (Koh-ma Be-ren-i-sez) A tiny constellation - tiny in size, and somewhat unimpressive in stellar brightness (its brightest star is Beta at a paltry magnitude 4.2), but certainly not lacking in targets for the small telescope owner. It's the anchor of one of the ends of the famous Coma-Virgo super cluster, and thus contains a preponderance of galaxies. But that's not all - there's also a really nice naked eye or binocular cluster, as well as two moderately bright globulars. This month's list should keep you busy for a while.

As the *Night Sky User's Guide* relates, Coma's story has that subtle ring of truth to it. According to the legend, King Ptolemy had long been away, at war with the Assyrians. In a sacrifice to ensure his safe return his wife, Queen Berenices cut off her long tresses and laid them out on the temple altar.

In the morning, predictably, the hair was gone. As the priests grew more and more nervous about what (or who) might be scarified in it's place, the royal astronomer Conon of Samos pulled their collective bacon out of the fire by claiming the gods had accepted the gift and displayed in the night sky for all to see.

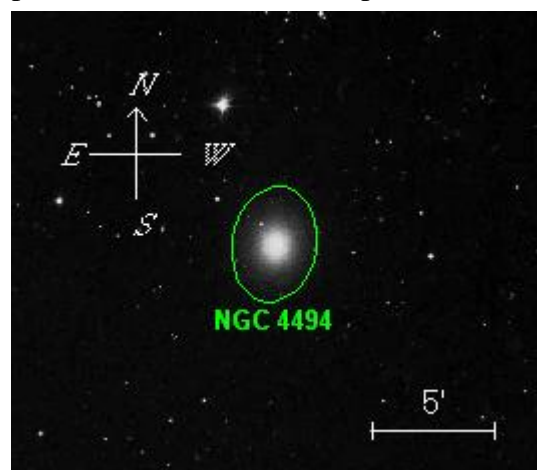
The most luxurious portion of the tresses of Berenices hair can probably best be seen in a small telescope or set of binoculars. I'm speaking of course, of the open Cluster Mel 111.



On a good night in the suburbs you should be able to see a fine shimmer of light just off the tail of Leo - this is Mel 111 otherwise known as the Coma Star Cluster. On transparent nights, it's a gorgeous naked eye sight from a suitably dark location, but even under moderate lunar illumination or light pollution, I find Mel 111 to be nearly invisible to the naked eye, but a fine sight in small to moderate sized binoculars or a small telescope. Just be sure that the scope is capable of low powers and very

wide fields of view, as Mel 111 is fairly large in size. Measuring about 5 degrees in diameter, it's about 9 times the size of the full moon. Its brighter stars consist of a scattering of 4th and 5th magnitude luminaries.

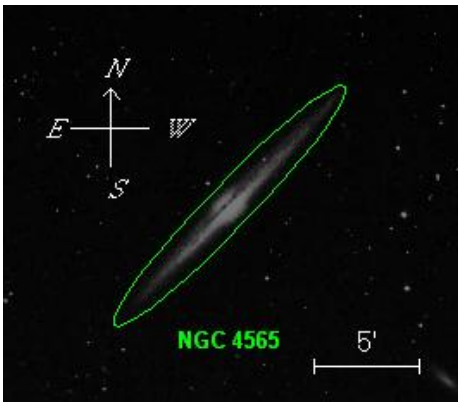
If you are in the area with a small telescope, take some time and stop off at NGC 4559, NGC 4494 and NGC 4565.



While you should content yourself with simply spotting these 4559 and 4494 in a small telescope, 4459 will reward your gaze with nearly any amount of aperture you can throw at it. Use moderate powers that yield somewhere around a 2mm exit pupil for your best shot at detail.

If you aren't familiar with the concept of exit pupil, it's figured by taking the aperture and dividing by the magnification, and is used as a standard of image brightness. For example, in a 4" (102mm telescope) a magnification of 50x will yield a 2mm exit pupil. For most extragalactic DSO's I find the best views to be at exit pupils of 2-3mm.

As you increase the aperture with 4559, keep an eye out for mottling and a dark patch just off the core.



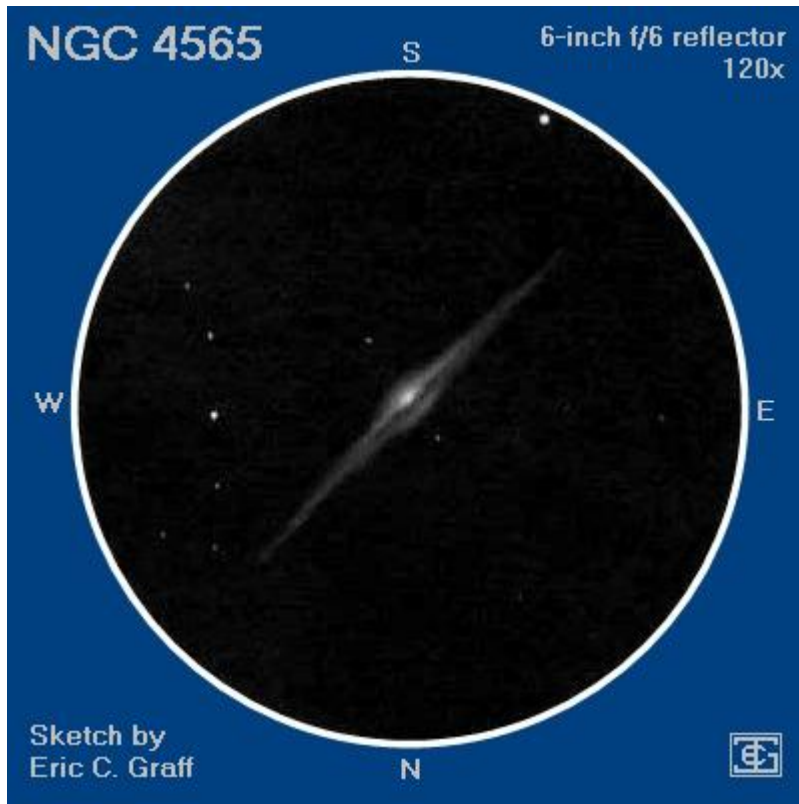
NGC 4565 - Dean Rowe - 14" Meade LX200GPS

One of the showpieces in this area, and certainly a masterpiece Messier missed, is NGC 4565.

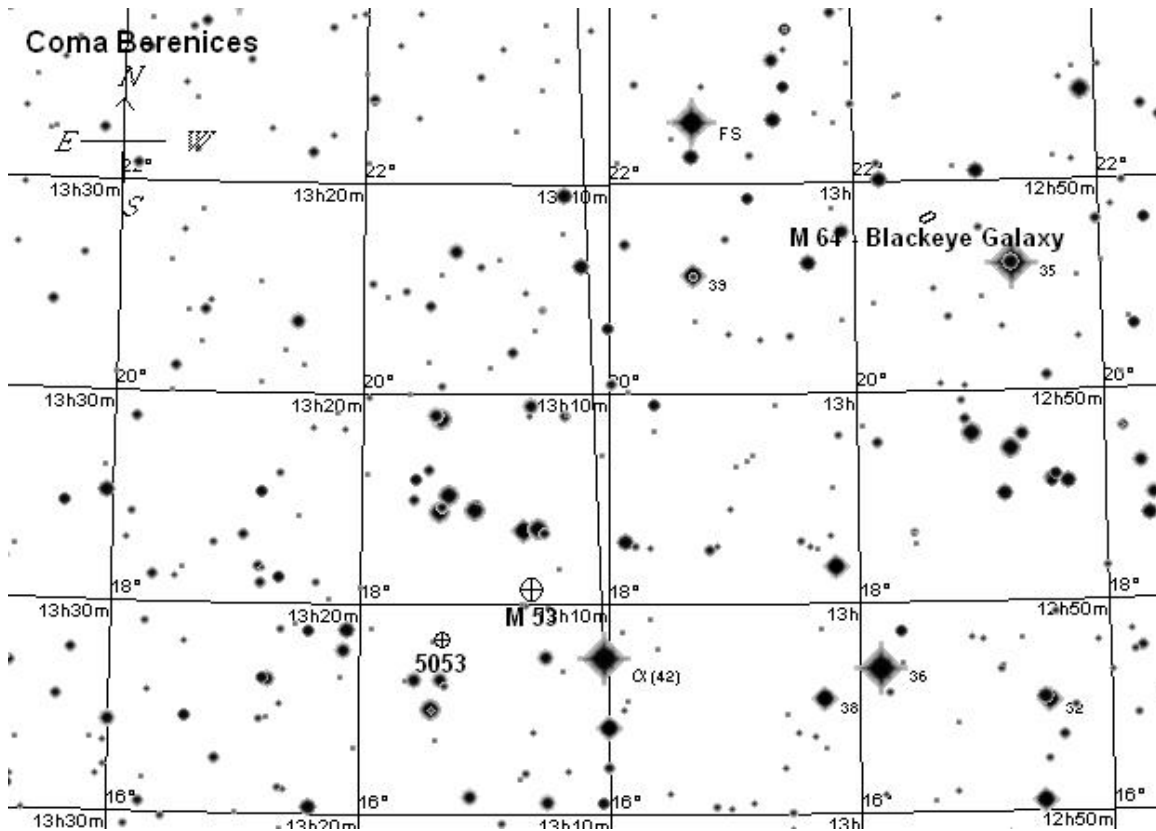
In smaller scopes look for a thin needle like slash of light. In 4-8 inch scopes try using 1-2mm exit pupil and looking for the dark lane. Visually, I find this to be slightly offset from the bright core, and fairly easy in an 8" from a dark site. To my eyes, it is more like

Eric Graff's sketch than Dean Rowe's wonderful image above. The DSS image to the left is very similar to what I see in a moderate sized telescope.

If you happen to any star parties this summer, do yourself a favor - walk up to the largest telescope you can find (the bigger the better) and ask them to point it at 4565. Impressive at moderate apertures, it's stunning in larger scopes. I find it to bear a marked resemblance to NGC891 - a favorite fall target. I'll bet with good skies, large binos and a little bit of work, you can pick it out without a telescope.

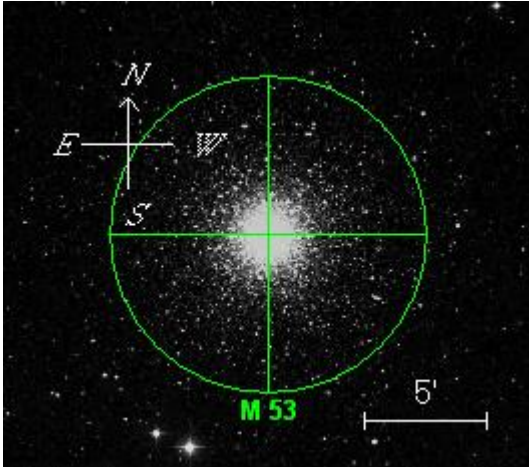


We'll be back to this area for the challenge object, but for now, let's move down to the Alpha Comae region.



M53 - Jason Blaschka - Star HOC 8" F4, GP mount

There are two real targets of interest in this area, M53 and M64. M53 is located just north east of Alpha Comae (Diadem). It's a puffball in a small scope, a treat in a moderate sized telescope, and stunning in a large one. As you increase aperture and power look for increased resolution across the face of the globular as well as more stars throughout the outlying region. As per resolution, small apertures will show the least, moderate apertures will resolve the outer limits of the cluster, yielding some granularity to the core, and large



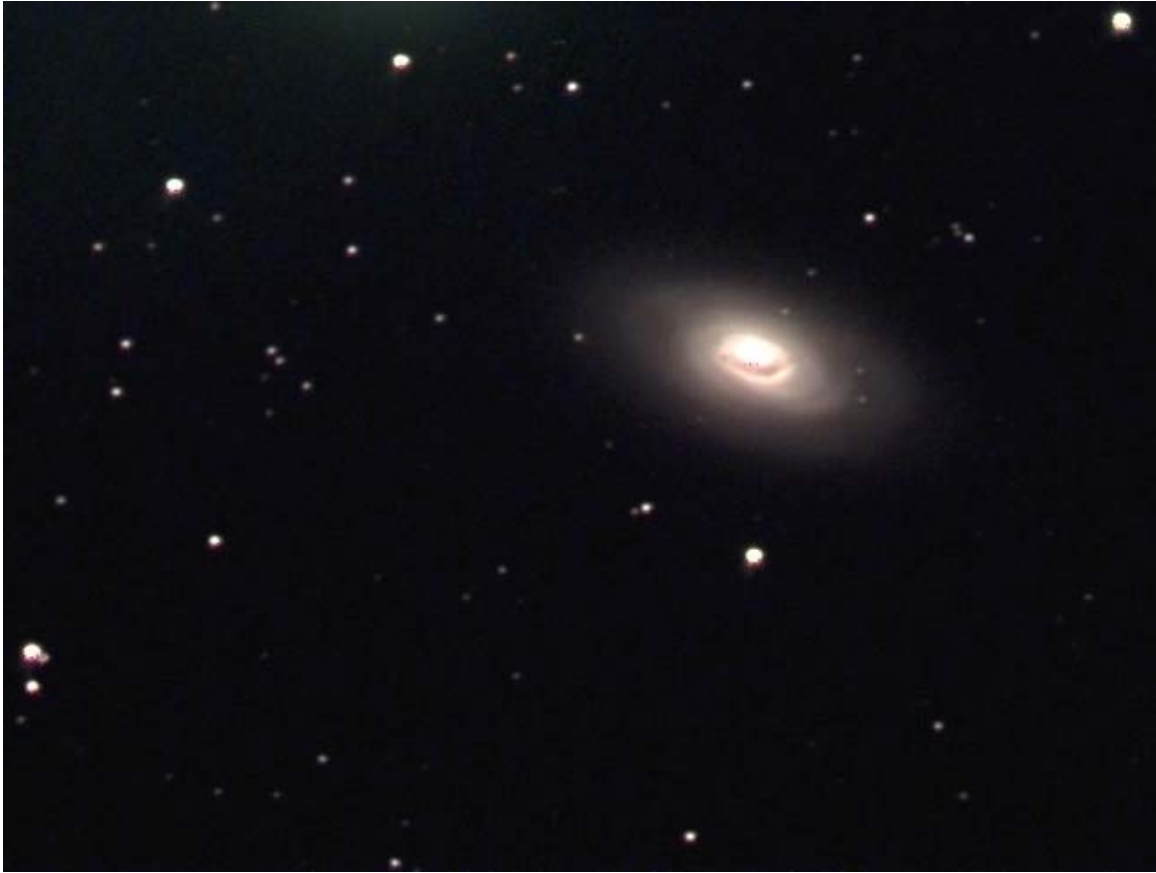
scopes will resolve the cluster across the face. The most memorable views I've had of this globby were with my 18" obsession at about 180x.

Going to the other extreme, it's equally fun to see if I can pick this messier up in a set of binoculars. What's the smallest aperture you've ever seen it in? For me, it's a 70mm Pronto - my notes say that I didn't pick up a hint of resolution at any power.

While you're here you might as well spend a few minutes looking for NGC5053 - (I call this one "The Ghost").

Stefan Van de Rostijne e-mailed me to describe his view of 5053 - "It is a while ago, some 3 years, in the Southern French Alps, under a mag 6.5 - 7 sky and very transparent air (altitude 1200 m elevation). I saw it with my 12.5" dob at some 100-120x or around that. It was the one and only time I saw it, a very loose cluster of very faint stars, I wonder if any one of them is brighter than mag 13. I find it difficult to interpret it as a globular. It is not that far from M53, and easily located, but here in Belgium, I've never seen it at all..."

Let me know if you find it, and with what size telescope.



M64 - Todd Rogelstad - Meade LXD75 SN10

The other real gem in the area is M64 - the Black Eye Galaxy. Located a degree WNW from 5th magnitude 35 Comae, this one is spectacular in nearly any size telescope. On good nights, I've managed to catch the Black Eye darkening in an 80mm telescope (I missed it with a 70mm) but in my experience, larger telescopes tend to show it better. Not everyone agrees. Mallas (author of *The Messier Album*), claims M64's Black Eye is easy in a 2.4", and 4" but subdued in an 8", and that a 12.5" showed it only at moderate power. This galaxy is a real show stopper in my 18", and worth hours of investigation all on its own. Point whatever scopes you have at this celestial shiner, and take a look for yourself. How does aperture affect the visibility? How about different magnifications?

Before we get started on the rest of this month's targets, I'm going to be a bit unapologetic here and say that you will probably want to print off some individualized finder charts for the area using one of the freely download able sky charting programs available on the internet. The Virgo cluster has some 2000 members, and the cluster as a whole resides around 55 million light years away and is receding from us at 1100 kps, although differing members will have different distances and velocities. As we look into the Coma-Virgo super cluster, we're looking into our future. The local cluster - the cluster of galaxies to which the Milky Way belongs - is headed towards their center of mass. In intergalactic terms, these galaxies are fairly close, and there are LOTS of them. As any experienced star hopper will tell you, it's all too easy to get lost in this region of space.

Prepare yourself. I recommend the following free resources:

Cartes du Ciel - Patrick Chevalley

<http://www.stargazing.net/astroc/>

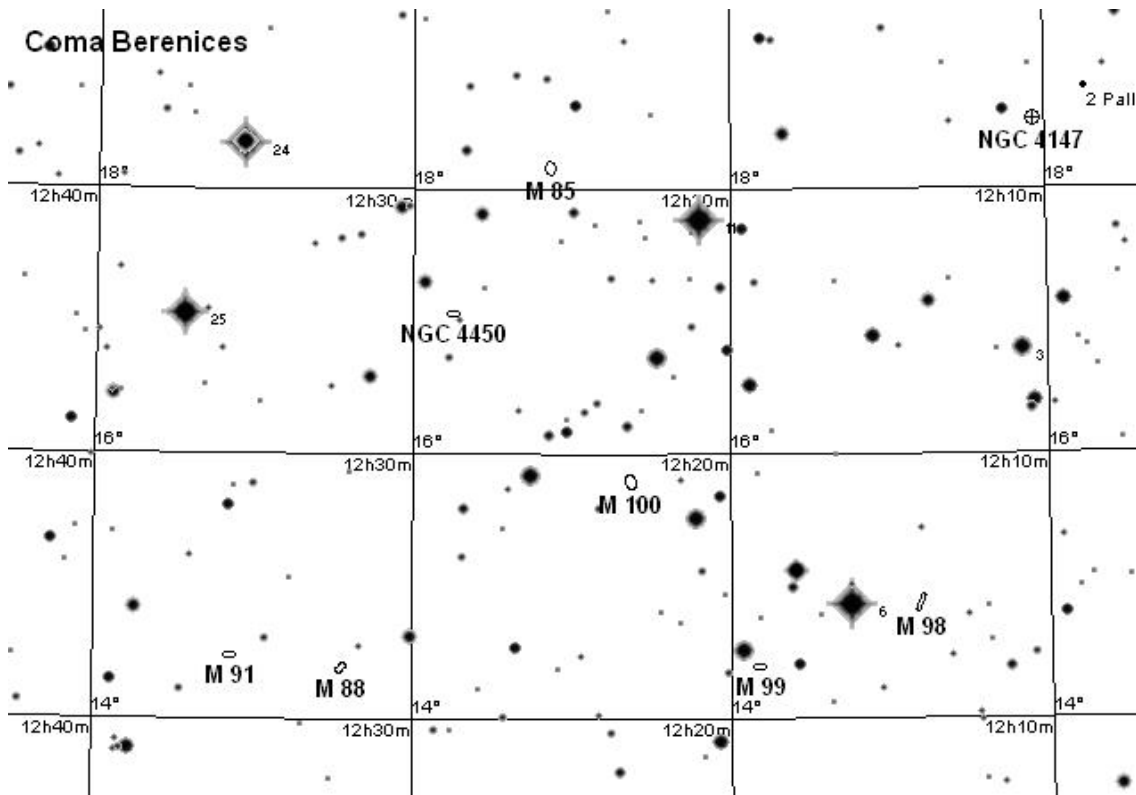
HNSky - Han Kleijn

<http://www.hnsky.org/software.htm>

Or, at a minimum, take a look at the following free (pre-generated) charts

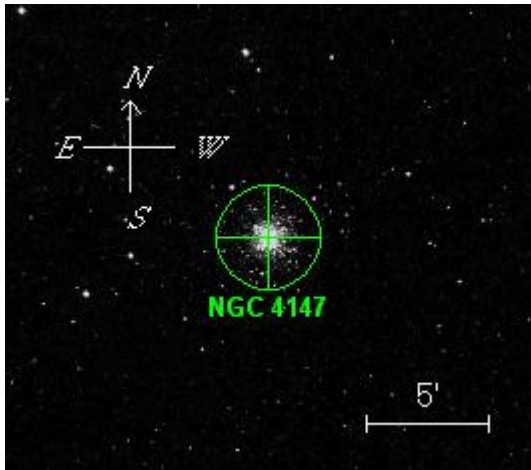
The Mag-7 Star Atlas Project - Andrew Johnson

http://www.cloudynights.com/item.php?item_id=1052



Now let's pop down towards the Virgo border - before we stick a toe into the depths of the Coma-Virgo super cluster proper, let's take a moment and check out NGC 4147...

With this one, I'll start right off by saying it's escaped me in my 4" telescope. In fact, the only one that I've managed to hit it in is my 18". That's not saying it isn't visible in a smaller aperture - just that I couldn't hit it at 4", and didn't have a chance to try anything else besides 18". I suspect it would be doable in a 6 or 8", and easy for a 10". Please let me know the smallest aperture you manage to grab it in. In the 18", I found it to be a nice,

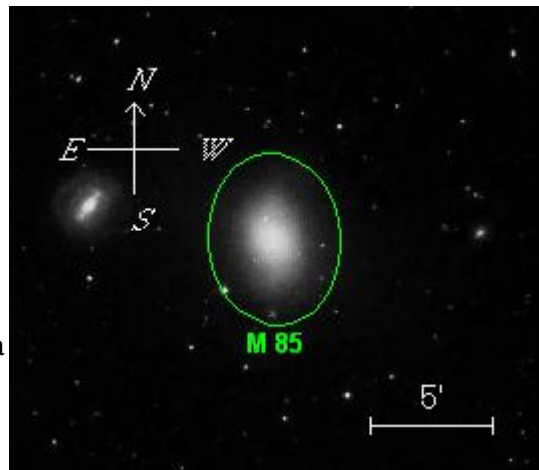


if somewhat unremarkable globular. It reminded me of some of the summer Messier globulars when seen through moderate sized scopes. What makes it remarkable, is the fact that it stands like a sentinel guarding the depths of interstellar space. From here on out, everything else is extragalactic.

Buckle your seat belts folks, it's gonna be an interesting ride.

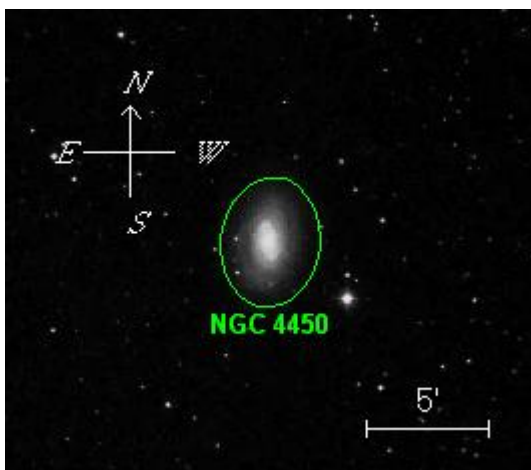
From here, let's pop over to M85.

M85 is a very nice (if a bit homogenous) target for the small telescope owner. O'Meara (*The Messier Objects*) notes a slight blue tint and a hint of spiral structure. I've never seen this in a small scope, but on the other hand, I don't have his eyes, nor do I observe from a volcano in the middle of the South Pacific! Take a gander with the largest telescope you can lay your hands on and see what you can see.



In the same photographic field, you'll note a pretty little barred spiral. This is NGC 4394. It should be a pretty easy pick for the small scope owner - it's quite bright and concentrated - however, one thing I've noticed is that targets like this tend to become "lost" when folks are looking at the "real" target.

After you spend some time with M85, look for a thin oval of light just to the east. The photo should help you pick it out.



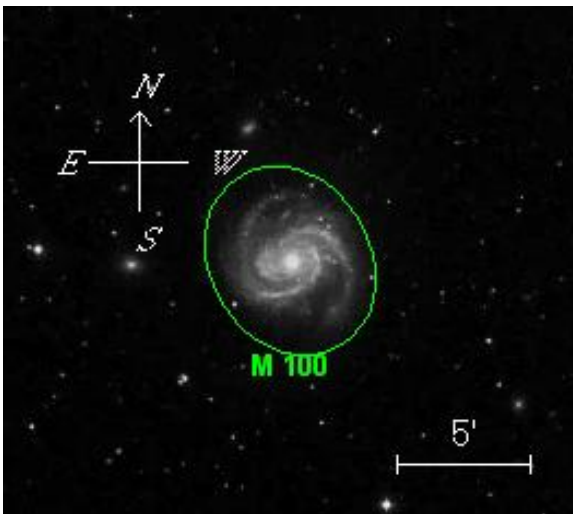
NGC 4450 is a nice target for an 8" telescope, and shows an obvious brightening towards the center. Larger telescopes show some mottling across the face.

Spend some time here and experiment with different magnifications. Is there any detail to eek out? What powers yield your best views? What exit pupils do these correspond to?

Although it looks fairly unimpressive at the eyepiece, check out [this superb image](#) by Adam Block over at [Spiral-Galaxies.com](#).



M100 - Todd Rogelstad - Meade LXD75 SN10



Next up is M100. This grand design spiral resides 55-60 million years out (like the rest of the coma cluster), and is a face on spiral with a diameter similar to that of our own galaxy. Don't let the images or the published magnitudes fool you - I've found that M100 really offers little to the amateur visual observer (at least with a moderate sized telescope) and can even be difficult to spot.

As always with a face on galaxy, the light is dispersed over a fairly wide area, where as with an edge on, it's concentrated over a smaller area. In short, we say it has a low surface brightness. Don't let this small fact

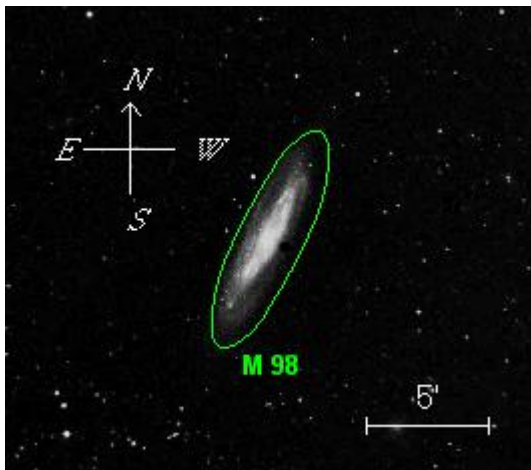
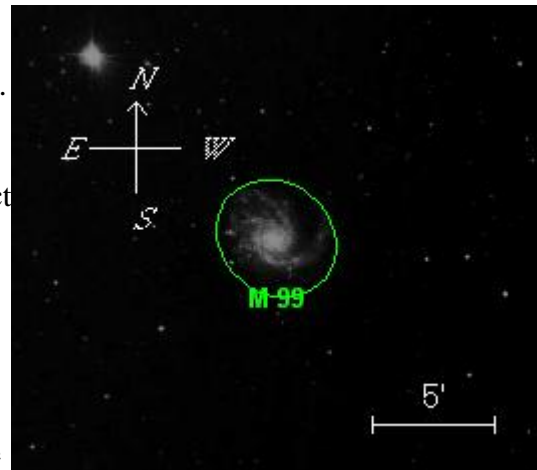
stop you from picking it off this month.



M99 - Jason Blaschka - Star HOC 8" F4, GP mount

Less than two degrees to the SW, you'll find M99. Visually, I find M99 to be a more rewarding galaxy than M100. With a 4", I see a round oval glow with hints of spiral arms, or at least a distinct mottling. From a moderately dark site, I've spotted faint spiral arms with my 8" telescope. In my 18", they are stunningly obvious. This is a wonderful target for a large telescope.

One thing to ponder while looking at face on's like M99 and M100 in small telescopes - do these seem more or less like comets - as compared to some of the other denizens of the galactic deep?



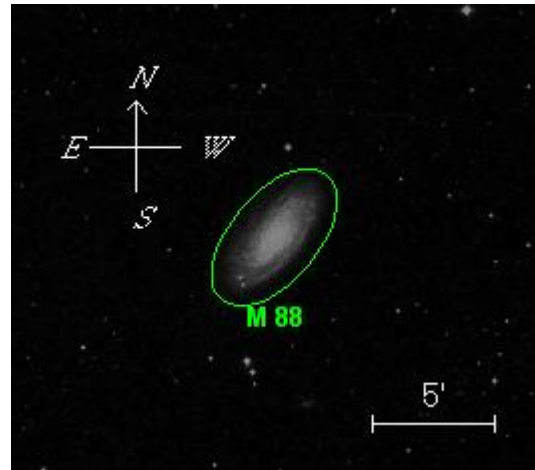
Slightly over a degree to the WNW we find M98.

This is an edge on spiral that's approaching us at 125kps (in contrast to the super cluster 1100kps recession rate) and as a consequence is one of the few galaxies in the night sky that actually shows an approaching blue shift instead of the traditional red shift. Like many in the the Coma-

Virgo super cluster it's about 55-60 million light years out.

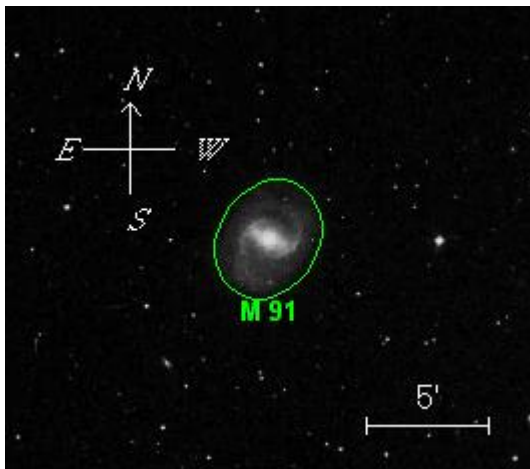
Since M98 is an edge on, it offers a bit more to the small scope owner than some of the previous targets. IT's certainly brighter than the other recent targets on the list.

Experienced observer O'Meara (*The Messier Objects*) notes that at 23x in his 4" refractor it resembles a Klingon battle cruiser. If you can't make that out in your small scope, don't fret - but do try larger aperture and darker skies.



If you have a widefield scope pop in your widest eyepiece, and you should be able to pick up all three of these galaxies in the same field of view - M98, M99, and M100. I've done this in a 70mm refractor, and was rewarded with a rather stellar view.

Now pan east for our last two (non-challenge) targets for the evening - M88 and M91



Mallas (*The Messier Album*) finds M88 to be "grand in the 4" Mallas refractor" with a smooth surface texture and uneven brightness. In my 4" scope, I must confess I found myself neither over, nor underwhelmed. Like many of the targets in Coma, I feel this one offers more to someone with a "bit" more aperture behind them than the typical small scope owner.

Many observers have commented on it's similarity to M31 - the great galaxy in Andromeda - unfortunately, this resemblance simply seems to escape me. Take a few minutes next time you are out and see what you think.

The final non-challenge object this month is something of a mystery object. For many years, M91 (NGC 4548) was considered to be a missing Messier. It had been suggested that it was a duplicate observation of M58, a misnotation of the position, or even an actual comet!

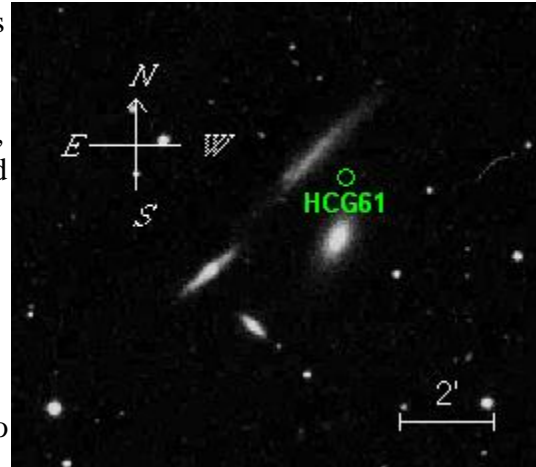
In *Messier and His Catalogue* (a chapter in Mallas and Kreimer's *The Messier Album*) Owen Gingerich from the Harvard Smithsonian Center for Astrophysics concludes that M91 is indeed a duplicate observation of M58, however (according to O'Meara) probably the most

widely accepted explanation was advanced in the 1969 December issue of Sky and Telescope by W.C. Williams - that being that Messier probably made a mistake in both reduction and plotting. Williams corrected for these and found that NGC 4548 at the indicated position.

In my 4" refractor, I found M91 to be fairly large at 70x, but faint and fairly difficult to spot under less than good conditions. What do you see?

Challenge Object - HCG61

This Hickson galaxy cluster (The Box), consists of 3 three interacting galaxies, and one foreground object (NGC 4173) not physically associated. From the top, proceeding clockwise, we have NGC 4173, NGC 4169, NGC 4174 and NGC 4175. Sky tools lists the magnitude of the cluster (or at least of it's brightest member) at 11.1. I'd suspect members of the group would be obtainable in a 6-8" scope under dark skies, but I haven't yet had a chance to check.



In the 18", it bore a rather strong resemblance to the DSS image to the right. While a four members were all plainly visible in the 18", I'd rate 4169 as the easiest, and 4173 as the hardest - while largest, it also has the lowest surface brightness - not altogether surprising given the image. Given the difficulty of 4173, an amateur viewing the Box in a smaller scope might be tempted to call it the Triangle!

Additional Reading:

M100's Interesting Galactic Nucleus:

http://www.seds.org/messier/more/m100_hst.html

Brian Rachford - Observing the Hickson Groups (with a 6" telescope!)

http://www.eskimo.com/~rachford/observing/hickson/h_groups.html

SuperClusters

<http://universe-review.ca/F03-supercluster.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
Please indicate if I can cite your observations in future columns.*

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