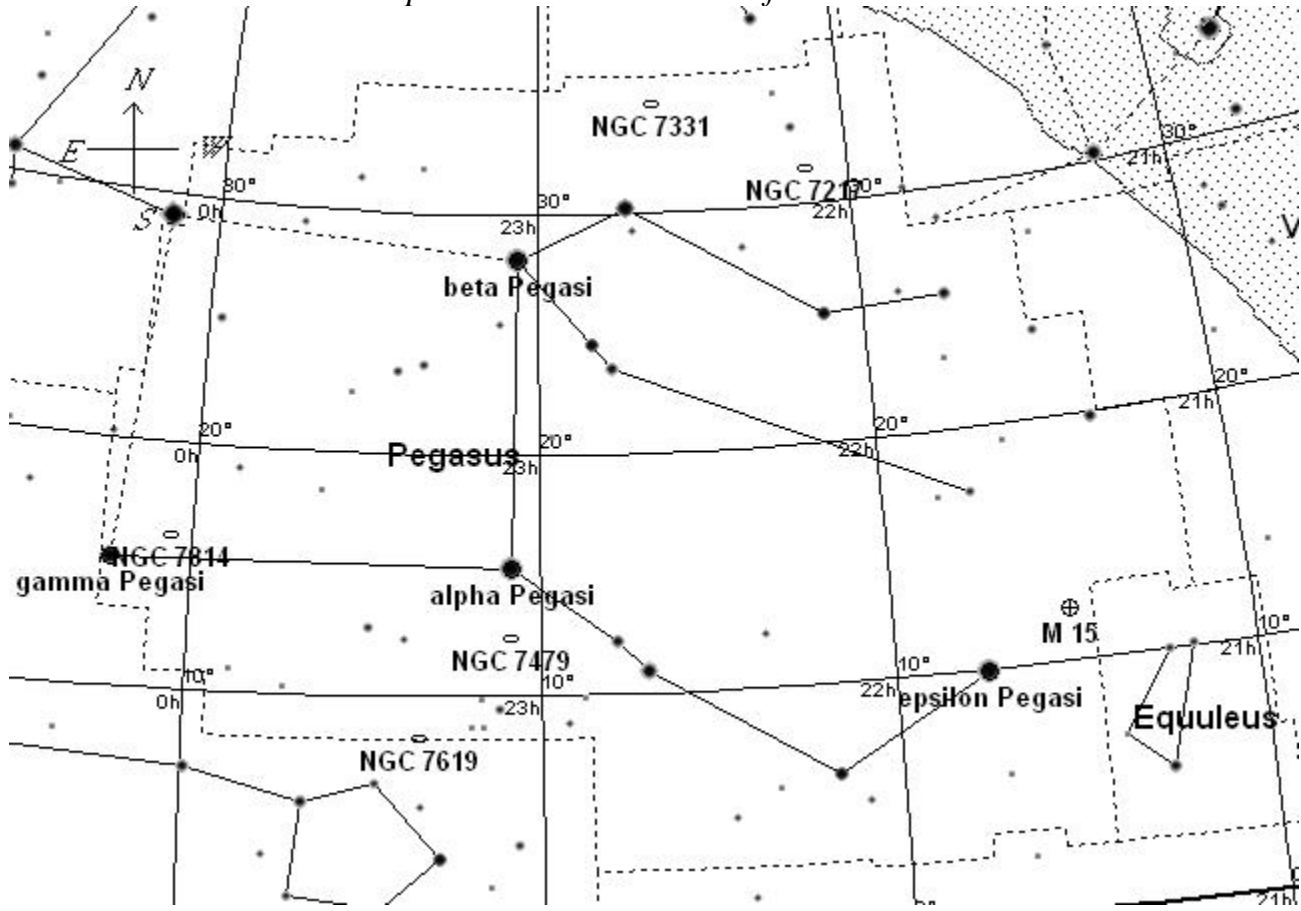


Small Wonders: Pegasus

A Monthly Beginners Guide to the Night Sky

by Tom Trusock

A printable version can be found [here](#).



Wide field Chart

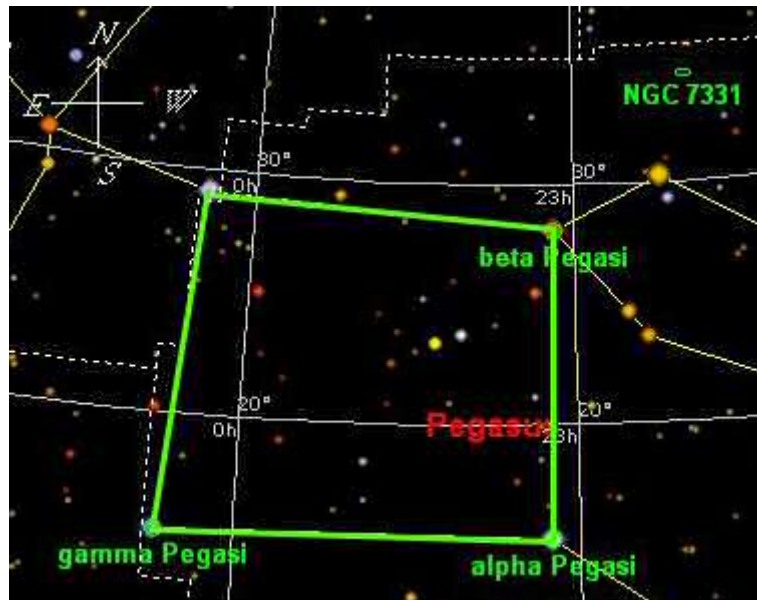
Target List	Name	Type	Size	Mag	RA	DEC
	alpha Pegasi	Star		2.5	23h 05m 00.2s	+15° 13' 57"
	beta Pegasi	Star		2.4	23h 04m 00.6s	+28° 06' 39"
	epsilon Pegasi	Star		2.4	21h 44m 25.2s	+09° 53' 52"
	gamma Pegasi	Star		2.8	00h 13m 29.4s	+15° 12' 43"
	M 15	Globular Cluster	18.0'	6.3	21h 30m 12.1s	+12° 11' 22"
	NGC 7331	Galaxy	10.2'x4.2'	9.5	22h 37m 18.4s	+34° 26' 50"
	NGC 7479	Galaxy	4.0'x3.1'	10.9	23h 05m 11.4s	+12° 20' 57"
	Pegasus I Group (Galaxy Cluster)					
	NGC 7619	Galaxy	2.5'x2.3'	11.1	23h 20m 29.5s	+08° 14' 03"
	NGC 7626	Galaxy	2.6'x2.3'	11.2	23h 20m 57.5s	+08° 14' 39"

Challenge Objects	Name	Type	Size	Mag	RA	DEC
	Stephan's Quintet (Galaxy Cluster)					
	NGC 7317	Galaxy	24"x24"	13.6	22h 36m 05.2s	+33° 58' 20"
	NGC 7318-2	Galaxy	1.6'x1.1'	13.2	22h 36m 11.6s	+33° 59' 37"
	NGC 7318-1	Galaxy	1.2'x1.0'	13.4	22h 36m 10.0s	+33° 59' 35"
	NGC 7319	Galaxy	1.4'x1.1'	13.3	22h 36m 16.8s	+34° 00' 12"
	NGC 7320	Galaxy	2.2'x1.1'	12.5	22h 36m 16.8s	+33° 58' 31"

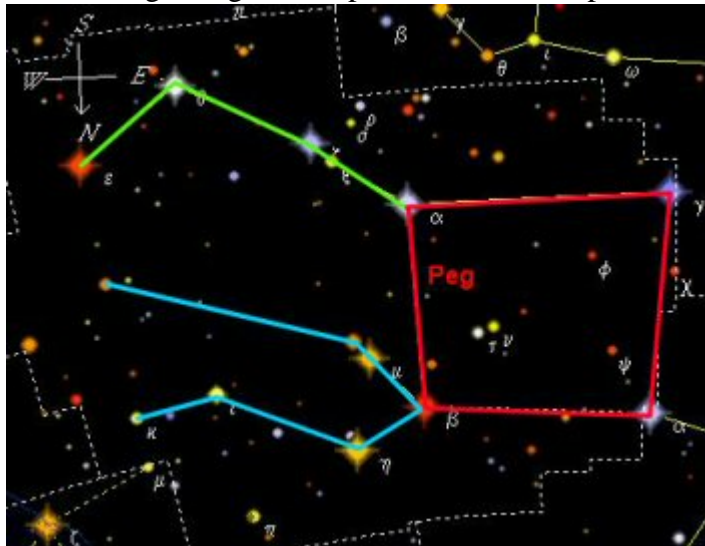
A SkyMap Pro Target List for these objects is available.

Ah Pegasus -

For naked eye observers, the great square of Pegasus is the dominant feature in northern hemisphere skies in the fall. Ironically, the stars that make up the "Great Square of Pegasus" are not all in Pegasus - the NE star is Alpha Andromedae. Alpha Andromedae was - at one point - shared between the two constellations, but when the official constellation boundaries were drawn up, the great square lost one of it's cornerstone to Andromeda - Alpheraz.



No matter - Andromeda is happy to lend it back as needed. Pegasus covers 1, 121 square degrees of sky - the seventh largest constellation overall - yet because of it's position overlooking intergalactic space, for small scope owners, it's relatively devoid of objects.



It you are lucky enough to own a moderately large scope (8 inches and up), then Pegasus will keep you busy for a very long time.

The winged horse Pegasus is be a fairly content creature - especially considering only his front half made it into the night sky - and upside down at that... If you have problems seeing a horse in this constellation, try the following. First, if you are in the northern hemisphere, stand on your head. Then reference the

picture to the left. Note that south is now up. The green is Pegasus's neck and head, the red is his body (sans wings) and the blue are his front legs out stretched in front of him - he's in full gallop.

Historically, we can trace Pegasus back to the ancient greeks - Pegasus was the offspring of Medusa and sprung from her neck after she was slain by Perseus. And we think sci-fi / fantasy is a "new invention" - Gotta love those ancients...

I first was introduced to the concept of Pegasus as a good test for limiting magnitude by Walter Scott Houston (*Deep Sky Wonders*). Houston notes that by counting the stars visible inside the great square you can determine your limiting magnitude. He notes that at mag 6, you should be able to see 13 stars inside the square. I thought it might be fun to take that a little further. I'd suspect that many readers of this column probably have skies worse than mag six, so I decided to go down in 1/2 mag increments.

30	Mag 6.5
13	Mag 6
7	Mag 5.5
4	Mag 5
1	Mag 4.5
0	Mag 4 (or worse)

Now you might want to check your NELM (Naked Eye Limiting Magnitude) when Pegasus is in several different locations - if your site is like most, the NELM will increase as Pegasus gets closer and closer to meridian - the imaginary line that passes from north to south directly through the zenith (zenith being a point directly overhead). Depending on sky glow, humidity, local light pollution and other effects, your sky may actually be much brighter in certain areas than others - something good to be aware of when planning starhops.

Lets take a quick look at the three cornerstones of the Great Square that actually lie in Pegasus. Starting with the SE corner and proceeding counterclockwise around the square we have:

Gamma Pegasi (Algenib) at mag 2.83, it's the third brightest star in the constellation pegasus. Hipparcos data places it at 333.15 light years away so the light you see tonight was leaving this star in 1670. To give you a taste of current events, in 1670: The Hudson's bay company was formed, the Kings of England and France met in secret to sign a treaty ending hostilities between their nations (at least for a while), Phosphorus was discovered, Senegal was settled by the French, a Cossack rebellion in the Ukraine

was crushed, and Henry Morgan captured Panama.

Alpha Pegasi (Markab or Marchab) is mag 2.49, and is placed at a mere 139 light years away (again Hipparcos) - the closest of the three. The photons entering your eyes tonight left around the year 1864. This year saw the continuation of the American civil war, Montana becoming a territory, 70,000 people killed as a cyclone swept through Calcutta, James Clerk Maxwell discovered microwaves, Emil Nobel was killed while experimenting with nitroglycerin, and the birth of both Jacob Astor and Toulouse-Lautrec.

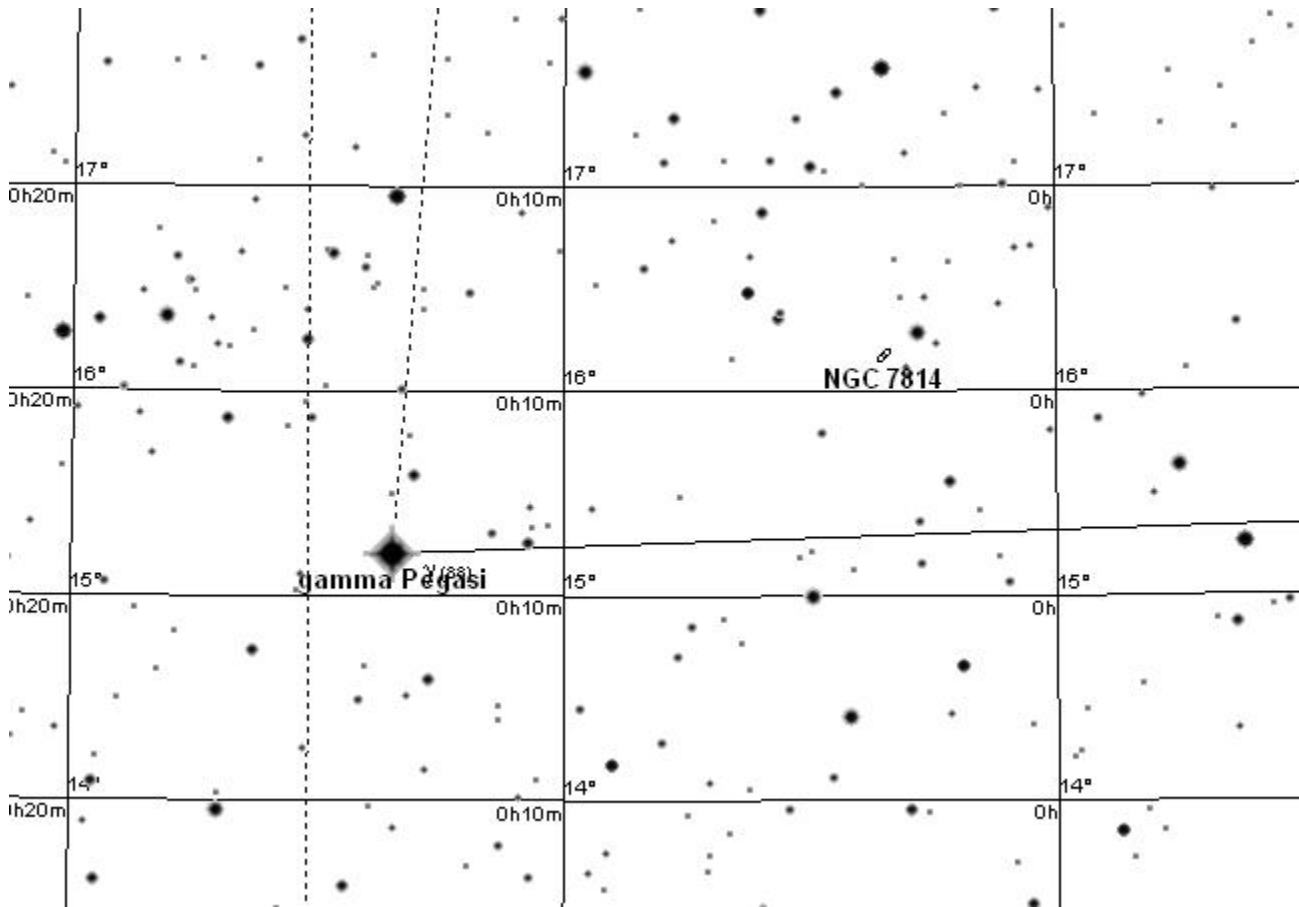
Beta Pegasi (Scheat) is around magnitude 2.4 and lies 199 light years away. In 1804, world events saw the end of French rule in Haiti, the start of the first Barbary War, the first steam locomotive, the Louisiana purchase, the beginning of the Louis and Clark expedition, Bonaparte crown himself emperor (the first emperor of France in 1000 years), Spain declared war on Britain, and the discovery of the asteroid Juno by German astronomer K. L. Harding. Ponder the the state of humanity as you gaze into the past at the deep orange of Scheat this evening.

- *Trivia - Alpha Andromedae (Alpheraz) was also known as Delta Pegasi until Pegasus lost that celestial tug of war...*

Not totally devoid of bright objects, Pegasus contains three Caldwells and one Messier object. While these objects are visible in fairly small scopes (especially M15), you're really in luck if you've already succumbed to that dreaded disease of both the mind and the pocket book - aperture fever - and have purchased a scope 8 inches or larger.

Now without further adieu, let's continue our tour....

NGC 7814 (also Caldwell 43)



First stop lies about two degrees west north west of Gamma Pegasi - the 10.5 magnitude galaxy NGC 7814. While this is a spectacular galaxy in pictures, small scope owners should just content themselves with looking for a small tuft of cotton floating in interstellar space.

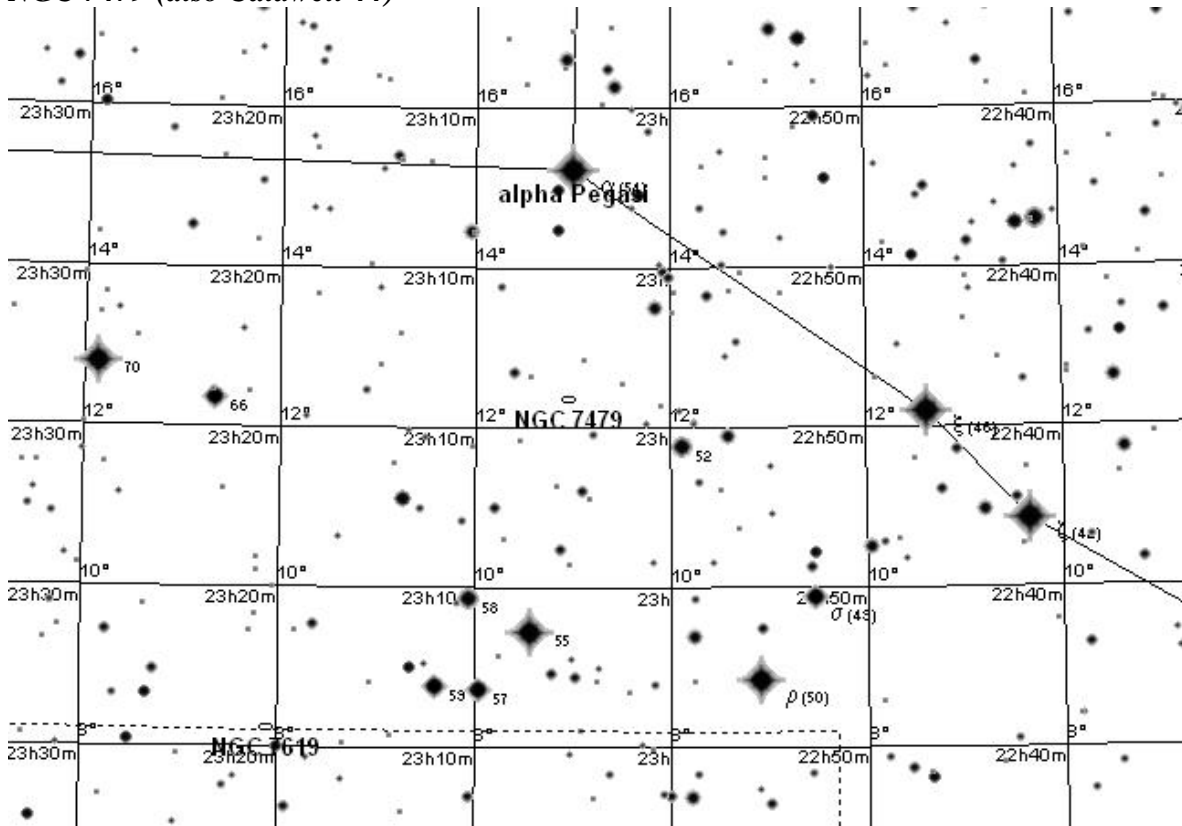
If you have a larger scope, be careful that you don't stop at NGC 14. This mag 12 galaxy might confuse you for a minute as it lies almost exactly between 7814 and gamma, but don't stop here.

While it's been seen in telescopes

as small as 4" from very very dark sites (but not by yours truly), I find that I usually need something more along the lines of 6-8 inches to pull it out. Ironically, the Night Sky Users Guide lists 7814 as a binocular object. I have my doubts, but must confess I've never actually tried. Perhaps someone out there would be so kind as to let me know the smallest aperture you can grab this faint galaxy through - can you indeed spot it in binoculars? As with all faint galaxies, try to minimize light pollution when searching - even the moon can seriously affect your ability to see it. Once you find it, try alternating between high and low powers and note the results.

A galaxies magnitude is not necessarily the best indicator of it's visibility in a small scope for several reasons - the magnitudes listed may actually be the photographic magnitudes - a film emulsion has different sensitivities than the human eye. Additionally, the magnitude describes the brightness of the object as if it were collapsed into a point - like a star. Galaxies have their light spread out over a larger area of the sky. A better indicator of visibility is a galaxies surface brightness - usually measured in magnitudes per square arc second - a brightness per area indicator. Still, don't ever let an objects low magnitude or surface brightness ever stop you from looking for it - you just may surprise yourself!

NGC 7479 (also Caldwell 44)



And now onto one of my favorite galaxies in Pegasus - NGC 7479

Continue along the bottom of the great square until you hit Alpha, then move about three degrees south.

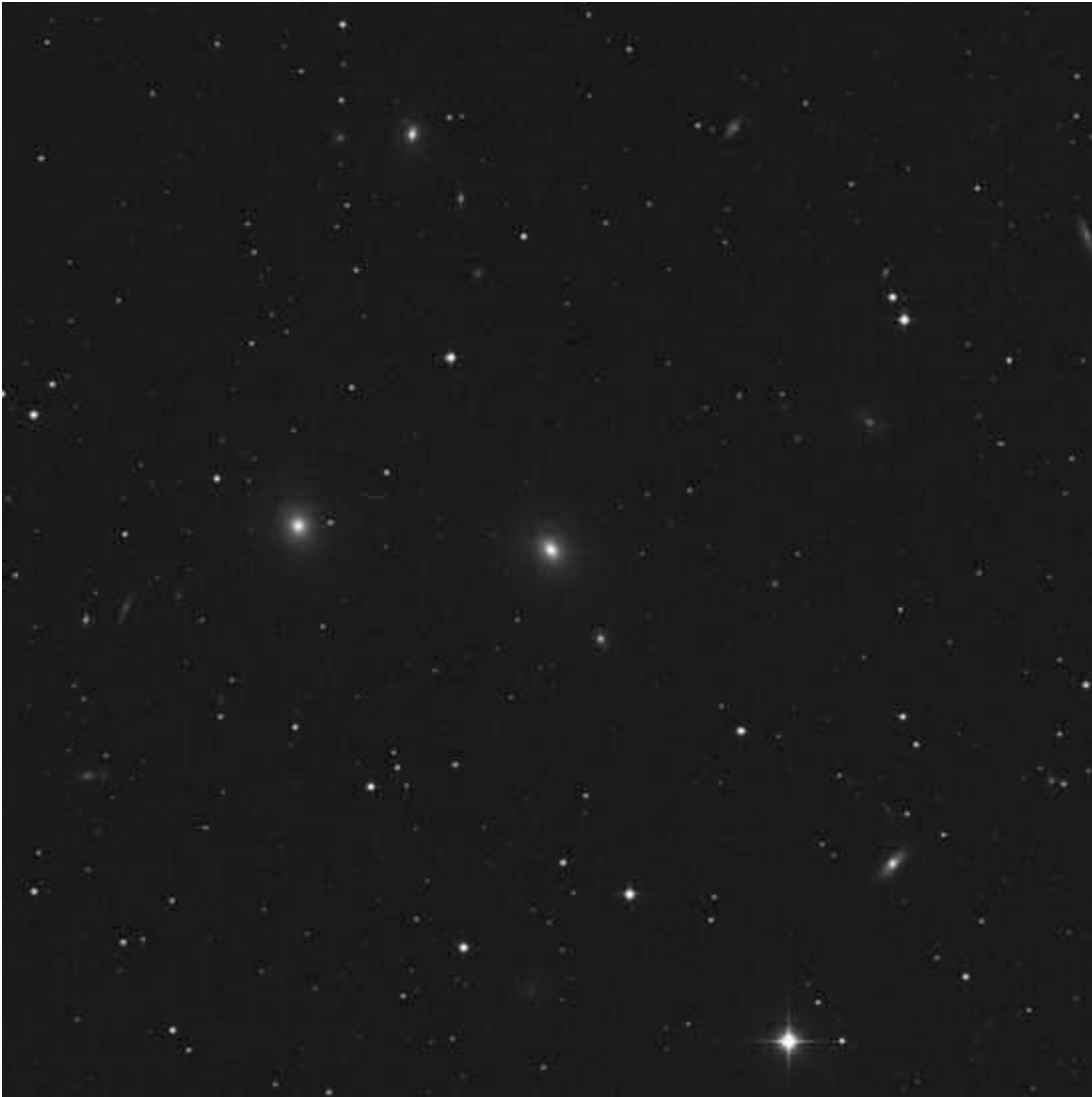
This is a very nice barred spiral galaxy, and serves as an excellent example of what larger aperture and darker skies can do - showing a progressive increase in detail with each size.. Smaller scopes should look for a straight wisp of light that may resemble an edge on or lenticular galaxy - larger scopes will begin to show progressively more detail. The view to the left greatly resembles

the view through my 18" at ~200x from a dark site, a star like core with two well

defined arms.

Steven James O'Meara showcases a drawing in *The Caldwell Objects* that looks remarkably like the DSS image shown above - and the truly amazing thing is that he was observing with a 4" scope. Granted it was from the pristine skies of Hawaii, but still it goes to show just what dark skies (and excellent well trained eyes) can achieve.

NGC 7619 and the Pegasus I Galaxy Cluster



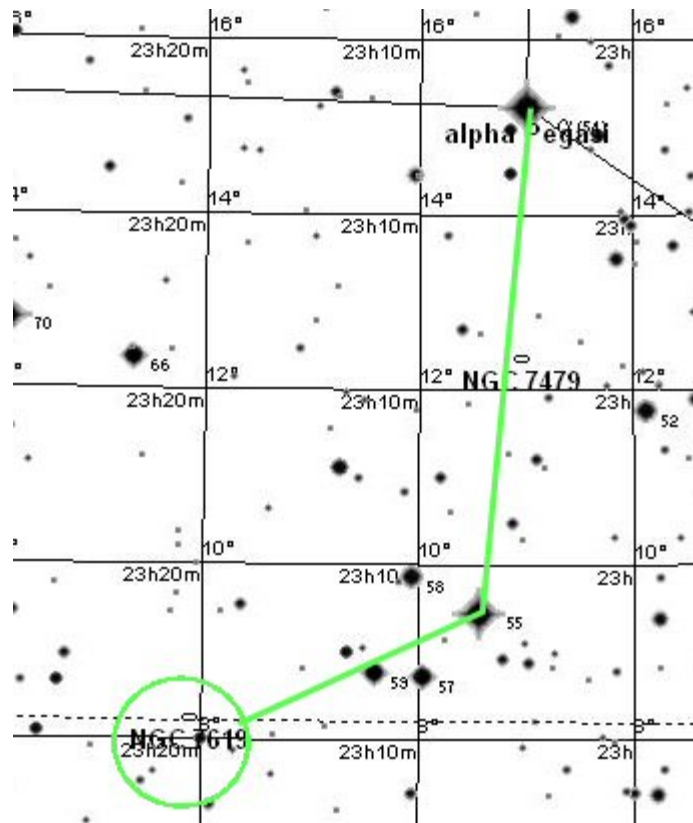
Right off the bat, I'll tell you this target's a tease. It really should have been a challenge object, but I wanted to reserve that for something special. Don't be dismayed if you don't find it, but if you do - let your mind encompass exactly what you are seeing. This is a fairly loose galaxy cluster located about 250 million light years away.

If you look carefully, you may find galaxies scattered across a couple of fields of view,

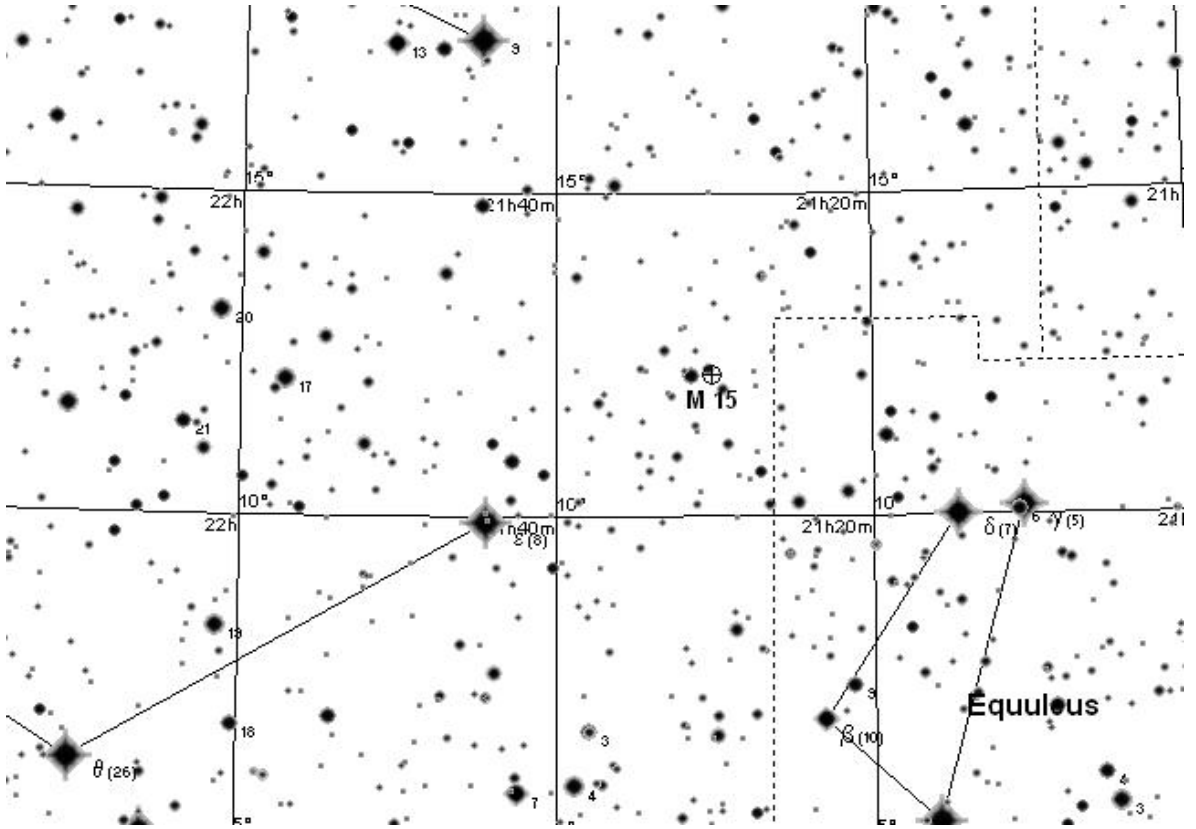
but NGC 7619 (center) and NGC 7626 (left) are two of the brightest members of the Pegasus I galaxy cluster.

While I've not quite managed them in my 4" scope, a buddy Ron B(ee) has managed to grab both of them and one other - NGC7611. An impressive feat for a 4" scope. Turn as much aperture as you have to this galaxy cluster and see what you can see.

Take time the time to let your eyes fully dark adapt. Try viewing with your head under a dark towel or sheet to shield all extraneous light, use averted vision and scan the field moving the scope very slowly - (we tend to pick up dim objects slightly better if they appear to be in motion).



M15



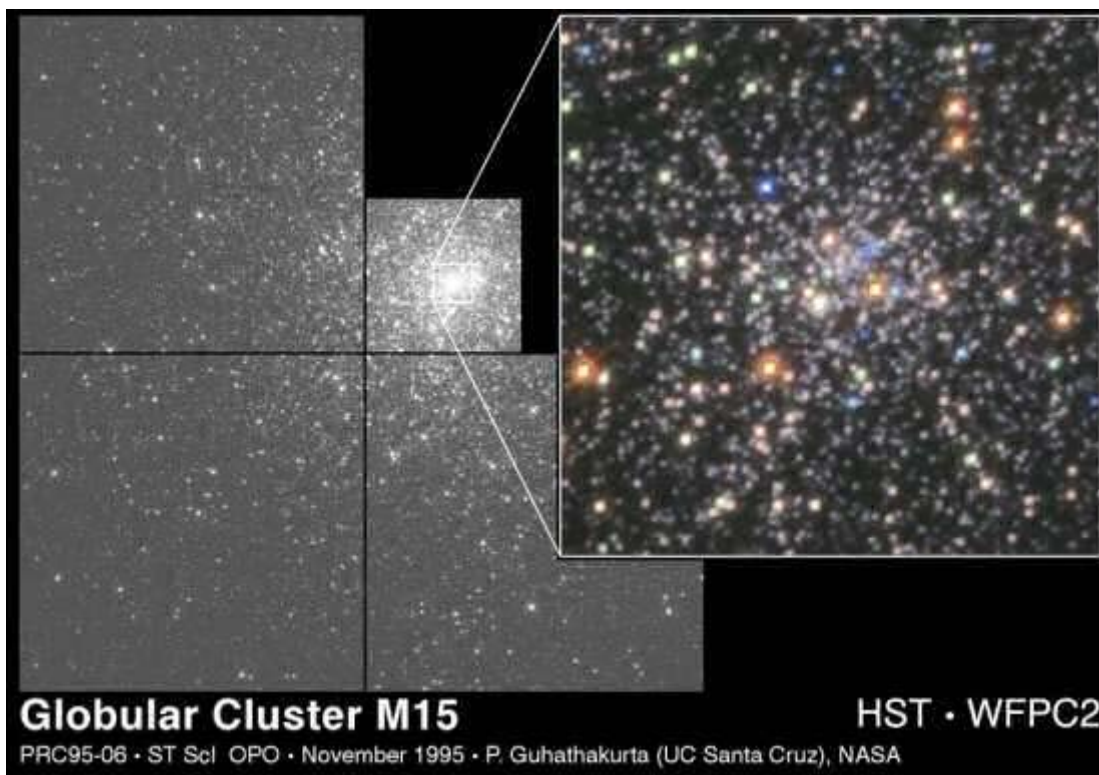
I frequently like to start my sessions with a spectacular object like M15, move on to the faint fuzzies, then after my eyes are used to searching for faint targets - finish up with a couple of bright showpieces. After all those dim faint galaxies, M15 will come across as a sensation to the eyes.

From a dark site, M15 is a naked eye object, and an easy catch in binoculars. With my 4" refractor, I find 100x and just under a degree field to be the perfect view. As I increase in aperture, I like to increase power. When I get to larger scopes, I find I'm

fond of busting this globular apart with 400 and 500 power!

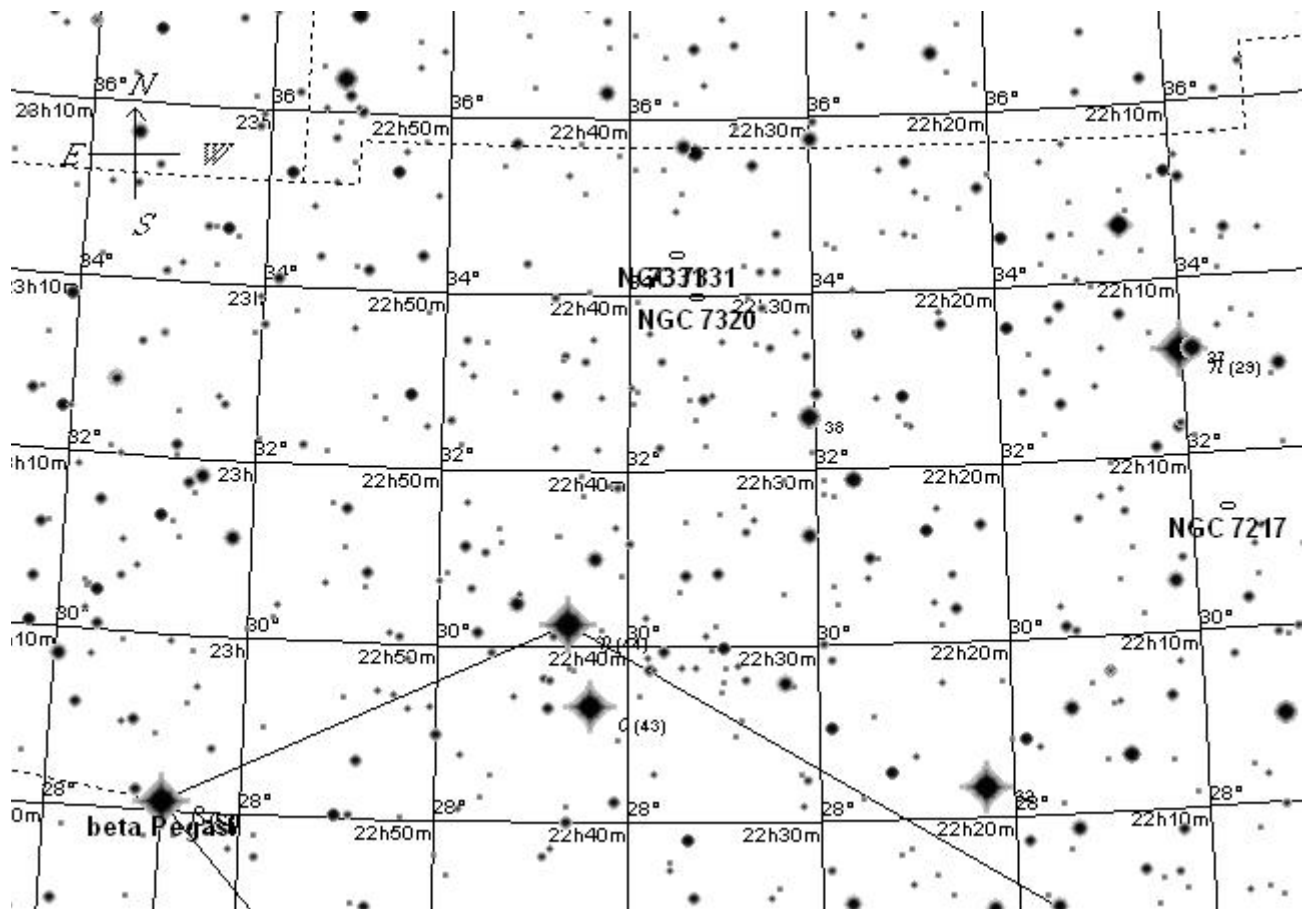
How much power does it take with your scope before the cluster appears resolved across the face?

M15 contains a secret prize for the careful observer - it's very own planetary nebula! Pease 1, found in 1928 by Francis Pease, was the first planetary nebula ever discovered in a globular cluster. Pease 1 is so far away it appears stellar at any power - the only real way to identify it is to star hop to the location indicated and then pop in an OIII filter. Because Planetary Nebulae are high in OIII, the rest of the stars in the field dim, and the one that remains bright - is the planetary nebula. While most observers who record Pease 1 are looking for it with large aperture, there are reports of it being caught with scopes as small as 8".



NGC 7331 - The Deer Lick Group (also Caldwell 30)





Welcome to one of the best galaxies in the fall sky. A galaxy that has been used in astronomy texts as an image of what the Milky Way would like like from a similar vantage point NGC 7331

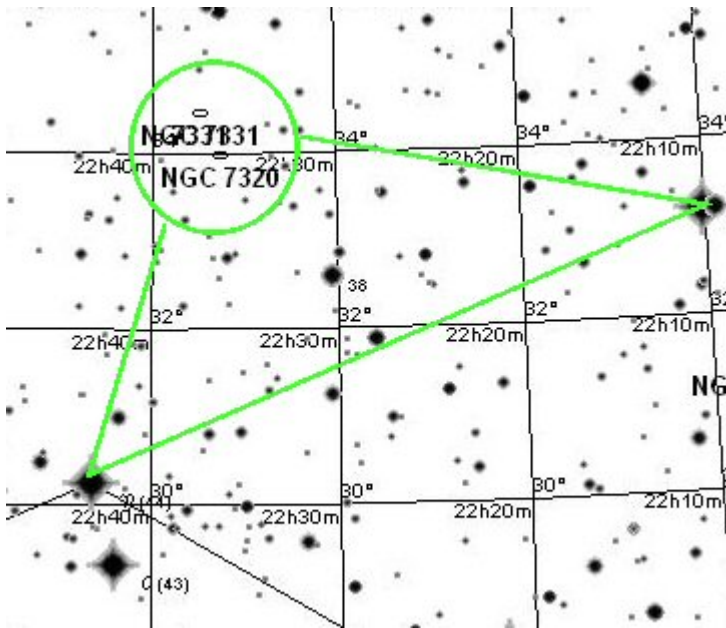
NGC 7331 is without doubt, the dominate member of the "Deer Lick group" - apparently received it's name in commemoration of an excellent night of observing at Deer Lick Gap just off the Blue Ridge Parkway in



NGC 7331 Image Courtesy Jason Blaschka

the North Carolina mountains.

An easy catch in my 4" scope at 40x, I note "...a fantastic needle that showed some apparent mottling..." with higher powers. While 7331 is spectacular in and of itself at any aperture you throw at it, larger scopes provide more of a glimpse into it's surroundings. With sufficient aperture, you can see it's a gulliver with lilliputians surrounding it. When viewed through a 15" scope, I've noted: "This SA(s)b m9.5 galaxy is simply superb... 99x does a wonderful job of framing the galaxy in it's surroundings, and even allows for occasional glimpses of what appears to be a dust lane on the western side. The core itself is non-stellar and perhaps even a bit mottled. Increasing the magnification to 243x darkens the sky further and allows a glimpse of a featureless NGC 7335 and NGC 7337. One should be sure to look for NGC 7336 which can masquerade as a double. It's "companion", a mag 10 star, lies a short distance to the north."



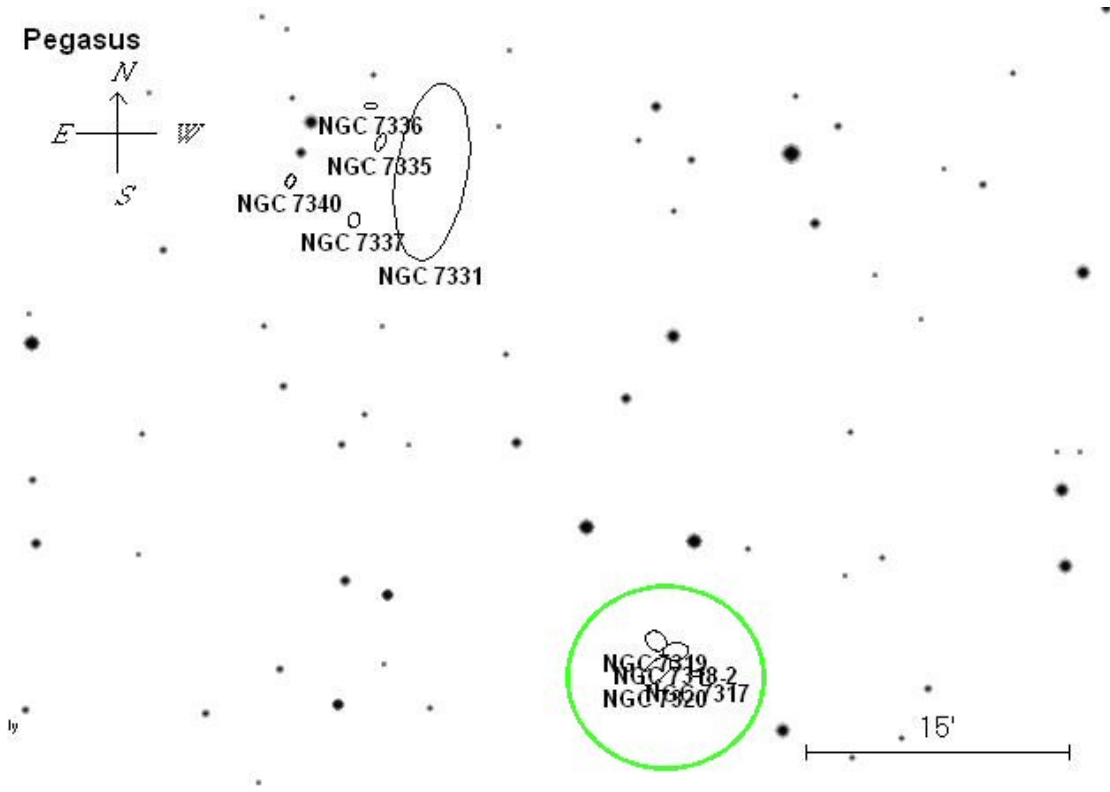
Although it fits easily into any telescope, O'Meara's book *The Caldwell Objects* tells us that NGC7331 is among the largest galaxies known, that it's diameter (for a accepted distance of 47 million light years) is 130,000 light years, and that it equals in both size and mass M31.

While it's a fairly bright galaxy, and should be easily picked up by sweeping, it might be a little hard to find the initial area. Fortunately, there's a solution. If you can

see Pi and Eta, naked eye then imagine a right triangle pictured above. 7331 lies right at the 90 angle. If you can't see these two stars naked eye, you may wish to start a star hop at beta and "come round the corner" so to speak. Which ever method you choose - don't give up, 7331 is worth the effort.

A beautiful object in it's own right, 7331 is a jumping off point for our final and challenge object this month.

Challenge Object: 7320 and Stephans Quintet





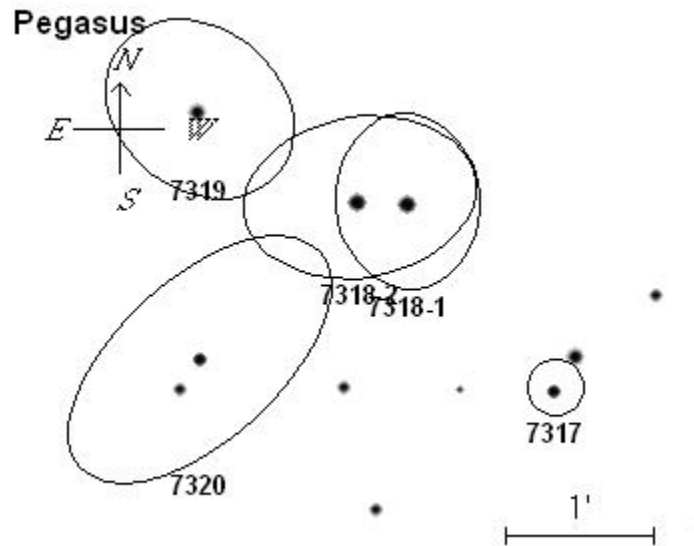
Stephan's Quintet - 5 galaxies squeezed into 3.5' of sky, Stephan's is on the must view list for any serious DSO observer.

Unfortunately, the brightest of the bunch NGC7320 is also fairly faint coming in at mag 12.5 From a moderately dark site, I've seen all 5 in a 10" scope, and 7320 should be visible in an even smaller scope under decent skies. The bottom line is, you'll never know till ya try.

Trivia - Another early movie star, Stephan's Quintet was used to portray a group of angels in the 1946 holiday classic - "It's a Wonderful Life"

While some might think this group a bit much for the typical small scope owner, but I've been constantly surprised by communications I've had with various folks - some seem to be hitting the challenge objects with little difficulty - so, I present the following:

- What's the smallest scope you can make out at least one of the members of Stephan's with?
- What's the smallest scope you can make out all 5 members with?



Additional Reading:

Historical events obtained from:

<http://encyclopedia.thefreedictionary.com/>

Pease 1 finder charts and observing reports can be found at - *Doug Snyder's Planetary Nebula Web Site:*

<http://www.blackskies.com/>

Hubble Pics of Stephan's Quintet

<http://hubblesite.org/newscenter/newsdesk/archive/releases/2001/22/>

Hipparcos Space Astrometry Mission

<http://astro.estec.esa.nl/Hipparcos/>

Recommended Books:

The Caldwell Objects - *Stephen James O'Meara*

The Night Sky Observers Guide - *Kepple and Sanner*

*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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