Binocular Observing Olympics II

Stellafane 2019 edition

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- To qualify for the BOO pin, you must see 15 of the following 20 binocular targets. Check off each as you spot them.

Seen	#	Object	Const.	Chart	Type*	RA	Dec	Mag	Size	Nickname
	1.	M81	UMa	1	GX	09 55.6	+69 04	7.0	26'x14'	Bode's Galaxy
	2.	M82	UMa	1	GX	09 55.8	+69 41	8.4	11'x5'	Cigar Galaxy
	3.	M51	CVn	2	GX	13 29.9	+47 12	8.4	11'x8'	Whirlpool Galaxy
	4.	M101	UMa	2	GX	14 03.2	+54 21	7.7	27'x26'	Pinwheel Galaxy
	5.	M5	Ser	3	GC	15 18.6	+02 05	5.8	17'	
	6.	M12	Oph	4	GC	16 47.2	-01 57	6.6	15'	
	7.	Garden Trowel	Sco	5	AS	16 54.7	-30 57	7-8	78'	
	8.	M10	Oph	4	GC	16 57.1	-04 06	6.6	15'	
	9.	M62	Oph	5	GC	17 01.2	-30 07	6.6	14'	
	10.	M92	Her	6	GC	17 17.1	+43 08	6.5	11'	
	11.	Hockey Stick	Sco	5	AS	17 25.1	-34 33	--	37'	
	12.	Barnard's Star	Oph	7/7a	*	17 58.7	+04 45	9.5	--	
	13.	M16	Ser	8	BN/OC	18 18.8	-13 47	6.0	35'	Eagle Nebula
	14.	NGC 6633	Oph	7	OC	18 27.7	+06 34	4.6	27'	
	15.	IC 4756	Oph	7	OC	18 39.0	+05 27	5.4p	52'	Graff's Cluster
	16.	Beta (β) Cygni	Cyg	9	**	19 30.7	+27 58	3.1,5.1	34"	Albireo
	17.	Barnard 142-143	Aql	10	DN	19 40.7	+10 57	--	80'x50'	Barnard's E
	18.	M71	Sge	10	OC	19 53.8	+18 47	8.3	7'	
	19.	NGC 7662	And	11	PN	23 25.9	+42 33	8.9p	32"x28"	Blue Snowball
	20.	NGC 1499	Per	12	BN	04 00.7	+36 37		145'x40'	California Nebula

*Type:

*	Single star	BN	Bright nebula	GX	Galaxy
**	Double star	DN	Dark nebula	OC	Open star cluster
AS	Asterism	GC	Globular cluster	PN	Planetary nebula
Note: The center of view, field of view (FOV), and limiting magnitude of each chart on the following pages are shown in the chart legend.					

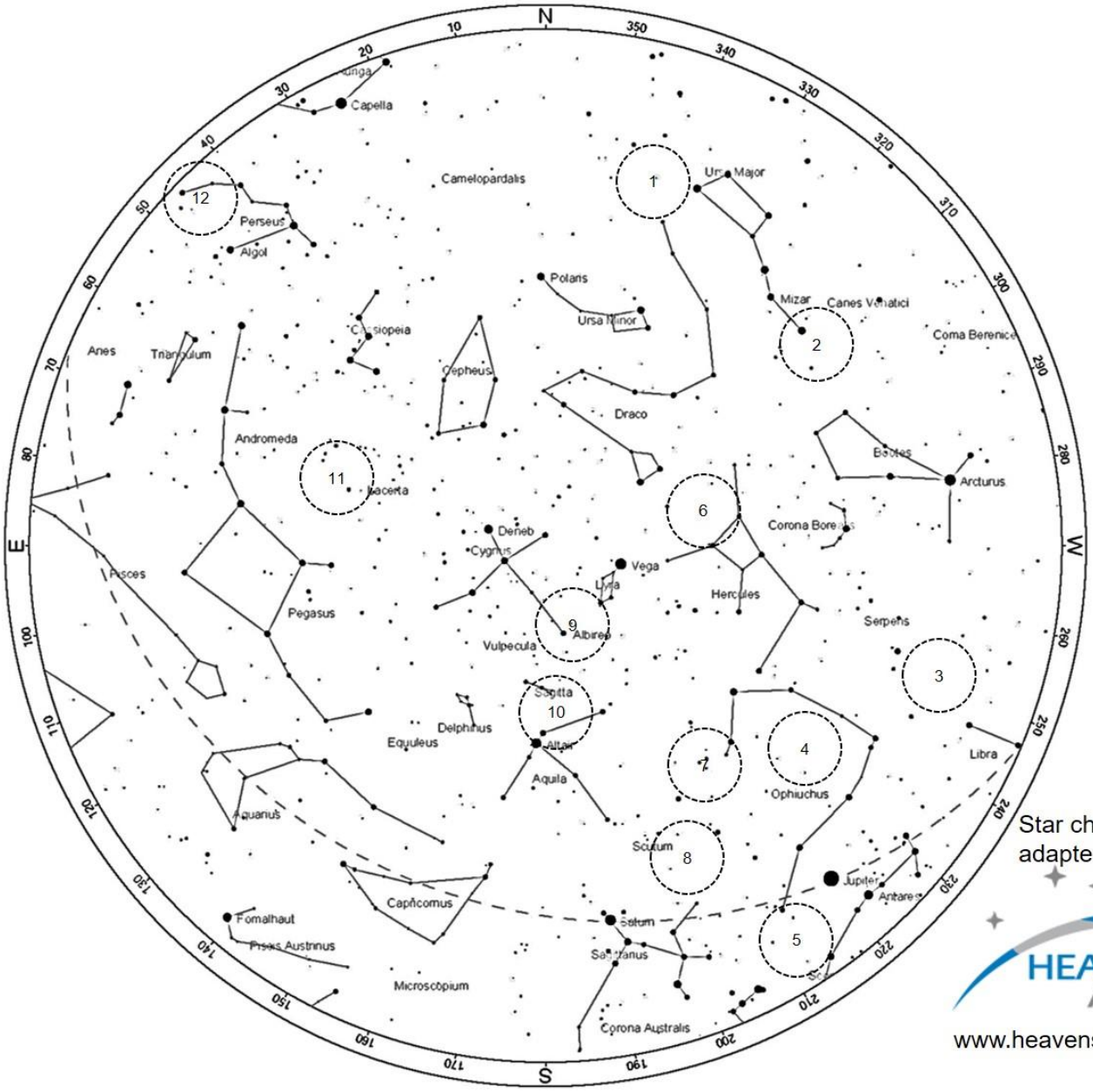
How did you make out with this year's list? And would you like to see a new BOO 2020 list next year? Drop me a line via my web site, philharrington.net, and let me know.

Good luck. And remember, two eyes are better than one!

All-Sky Star Chart

(chart drawn for 11:30 PM)

1 Circled areas correspond to the chart numbers found on the pages that follow.

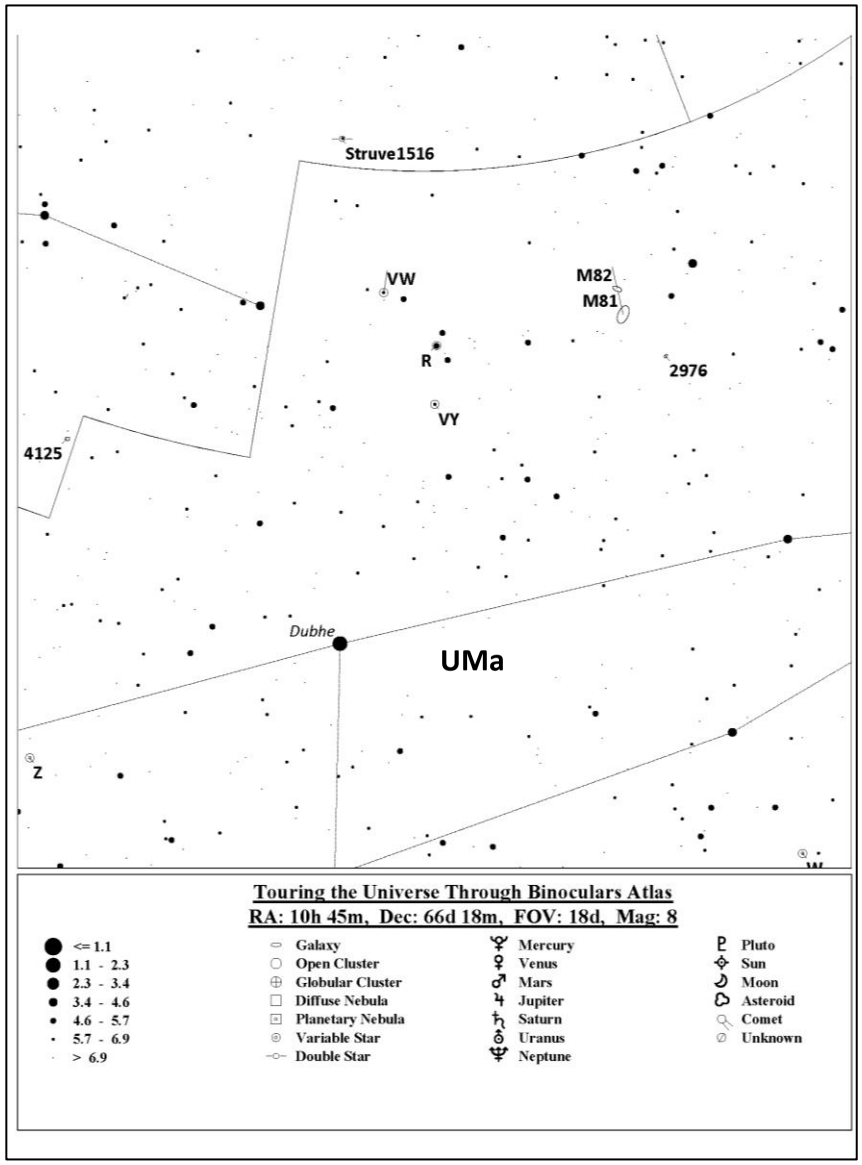


Star chart adapted from

HEAVENS ABOVE

www.heavens-above.com

1. M81 (Bode's Galaxy) and M82 (Cigar Galaxy)



M81 and M82 in Ursa Major are a galactic version of the Odd Couple. Nowhere else in the sky do we find such an unusual pair. On one hand, we have a textbook example of a spiral galaxy. Like Felix Unger, it appears neatly arranged and well groomed. On the other, we have Oscar Madison, an unkempt, disheveled galactic mess.

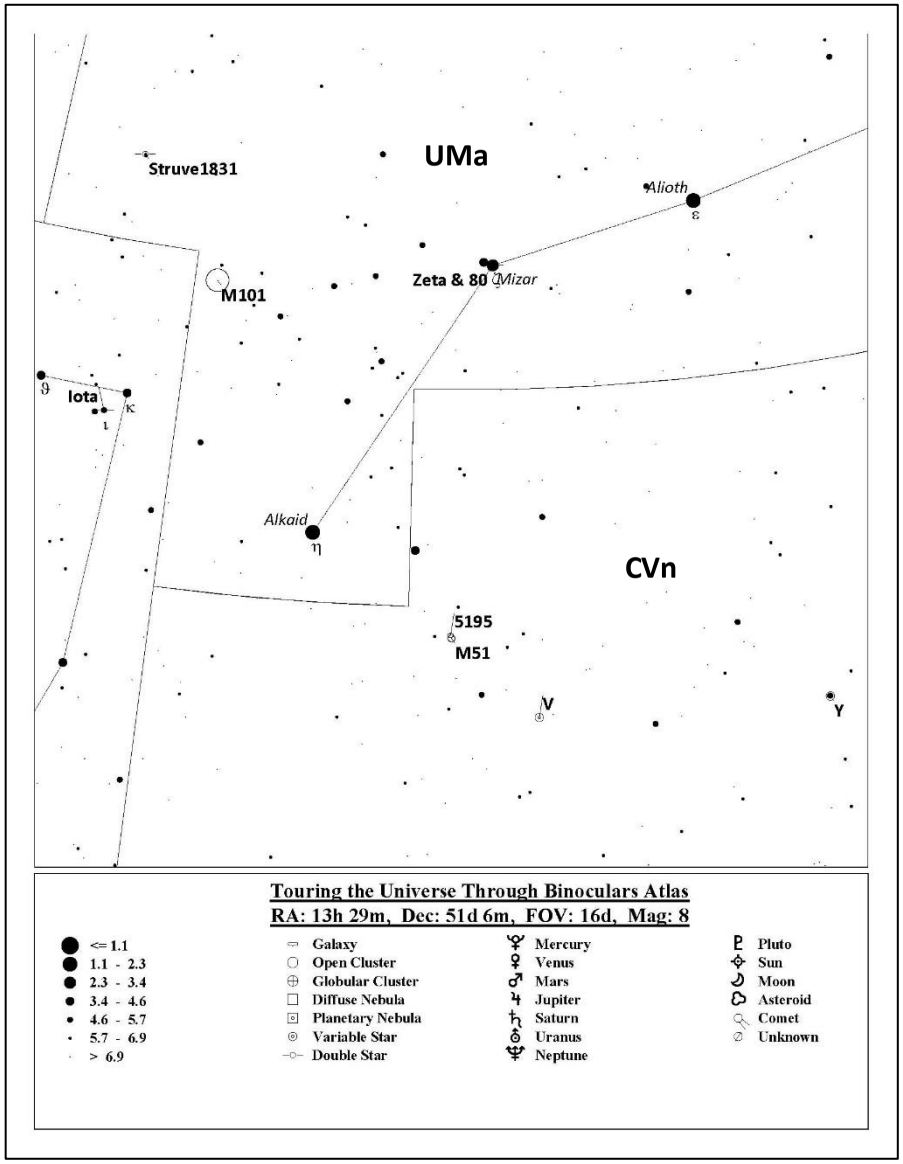
The Felix Unger of the pair is M81, a model Sb spiral system. The 18th-century German astronomer Johann Bode, then director of the Berlin Observatory, discovered M81 in 1774, five years before Messier added it to his catalog.

Through our binoculars, M81 looks distinctly oval due to its tilt from our vantage point. Centered within that oval glow lies the galactic core, appearing like a faint buried star.

Then we have the Oscar Madison side of the couple, M82. Bode is also credited with its discovery in 1774. He probably didn't notice it at first glance, since M82 is about a magnitude fainter than M81. But after closer inspection he did, and so can you. Glance about half a degree north of M81. M82 looks long and thin, somewhat like a cigar. With patience, I've spotted it through 7x35 binoculars under suburban skies.

Unlike M81, which flaunts a pronounced core, M82 looks pretty much uniform from end to end visually. Photographs, however, reveal a pair of huge plumes of matter extending from a dark rift that cleaves the galactic center in half. Many believe this upheaval is the end result of a collision between the two in the far-distant past. M81's greater mass disrupted M82, triggering tremendous internal turmoil and intense starburst activity.

2. M51 (Whirlpool Galaxy) and M101 (Pinwheel Galaxy)

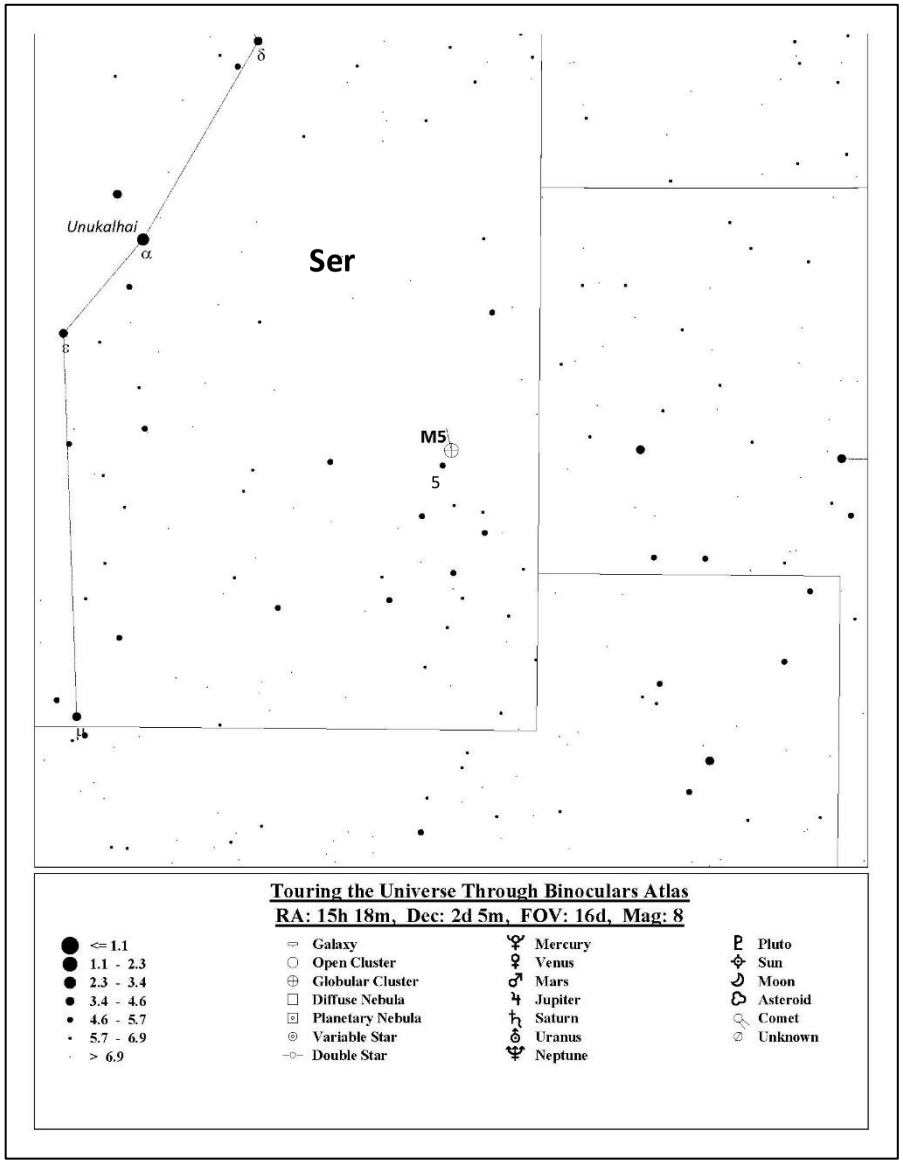


Aim toward Alkaid, the star at the end of the Dipper's handle. Look half a field to Alkaid's west-southwest for a 4th-magnitude star, and then from there, a trapezoid of dimmer suns an equal distance farther south still. If you look carefully just inside the trapezoid's eastern corner, you might spot a dim glow. That's **M51**, the beautiful Whirlpool Galaxy.

Through 70mm and larger binoculars, you might also notice that M51 is a little lopsided. That's because you aren't just looking at one galaxy, but two. Messier missed M51's companion, so you won't find it in his catalog. We know it today as **NGC 5195**, its listing in the New General Catalog. NGC 5195 glows modestly at about 10th magnitude. Can you see both?

Now, from Mizar, trace a zigzag line of four faint stars eastward, away from the curving handle. At the fourth star, hook a little to the northeast, toward a diamond of four fainter stars. Can you see a very faint smudge next to the diamond's eastern point? That's the famous spiral galaxy **M101**. M101 is tough enough to see through small telescopes, let alone binoculars, but it is possible. Be sure to use averted vision. Even then, M101 will probably impress you as little more than a very dim glow. But think about what you are seeing. Your binoculars are showing you a system of billions of stars. The light from those stars left there 27 million years ago, long before our earliest ancestors evolved on the grassy savannahs of eastern Africa.

3. M5

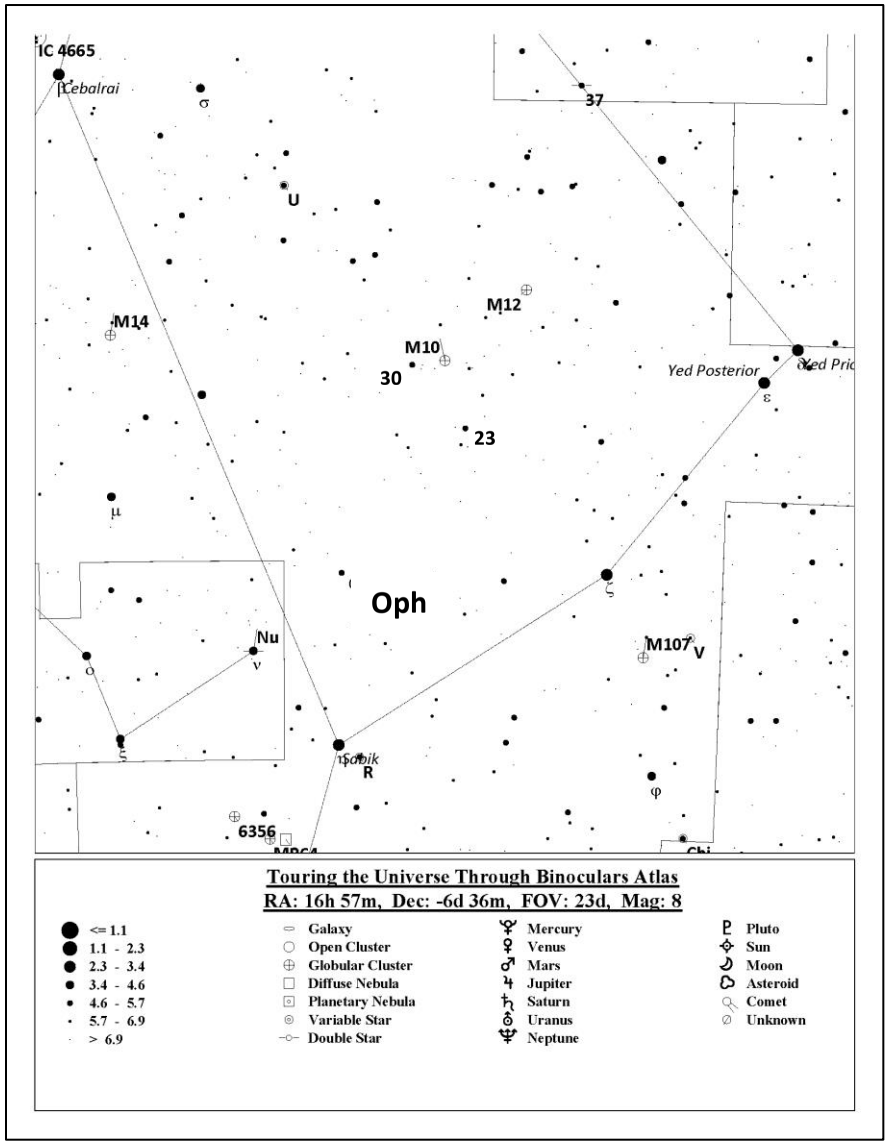


M5 was discovered by Gottfried Kirch from Berlin, Germany, on May 5, 1702. His notes described it as a "nebulous star." Although Kirch was Germany's first Astronomer Royal at the time, those notes remained unpublished until after Charles Messier independently found it on May 23, 1764. Messier described it as a "beautiful nebula; it does not contain any star." It was only after William Herschel viewed it through a larger telescope 27 years later that its true nature as a globular cluster became clear.

To find M5, cast off from Arcturus and slide southeastward to 4th-magnitude Zeta (ζ) Boötis. Continue from there twice the distance along a slightly more easterly course until you come to a not-quite right triangle of stars. The triangle's brightest star, positioned at the not-quite right angle, is third-magnitude Unukalhai [pronounced "oo-nook-ul-high," and also known as Alpha (α) Serpentis]. Next, turn to the southwest, toward 6th-magnitude 5 Serpentis. M5 will be just to its north-northwest. Through our binoculars, it looks like a fuzzy star, just as Kirch and Messier described.

Estimates say that M5 is 24,500 light years away and may contain as many as 500,000 stars crammed into a space about 165 light years across. By contrast, M13, summer's Great Hercules Globular, holds about 300,000 stars.

4. M10 and M12

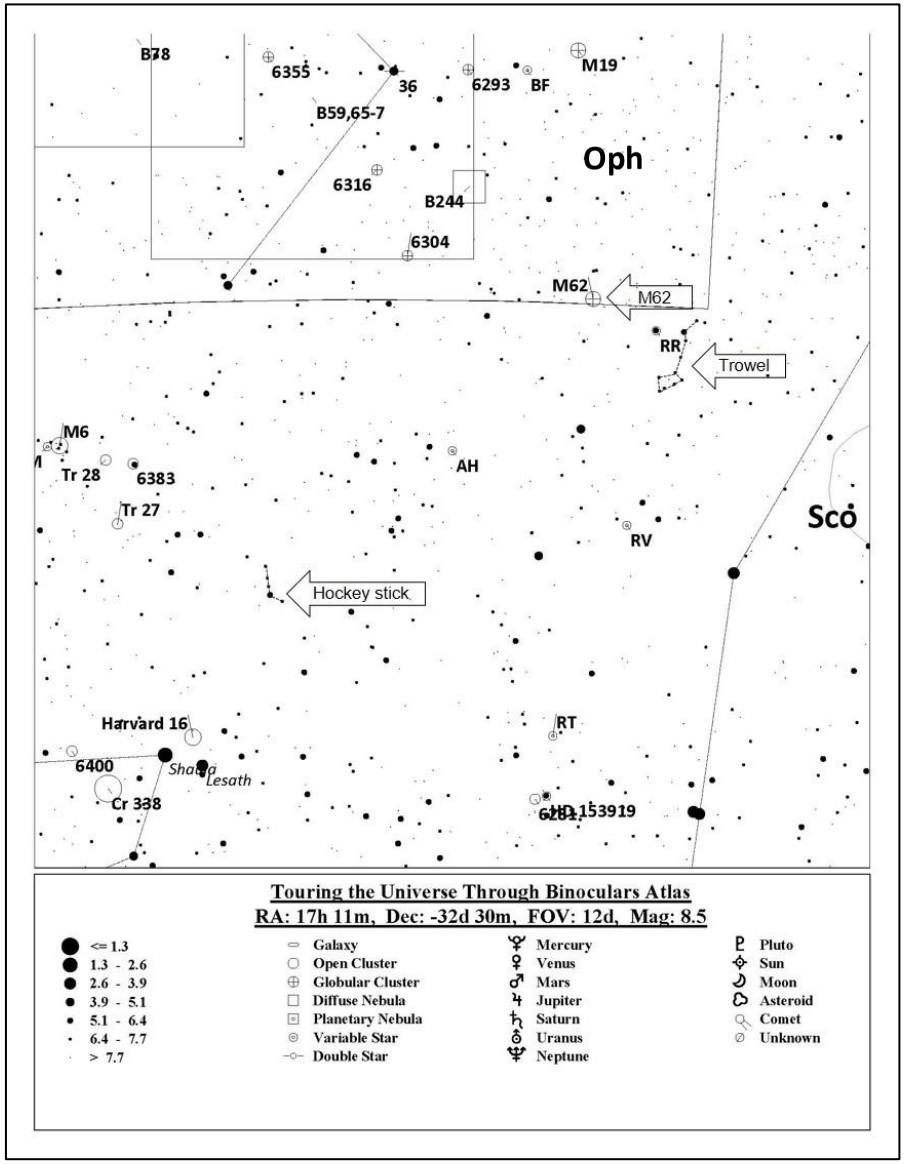


This pair of beauties lies smack-dab in the middle of the Ophiuchus hexagonal frame. **M10 and M12** easily fit into the same field of view and create a different sort of "double cluster" through our binoculars. Charles Messier was on a roll when he discovered M10 on May 29, 1764. He had just found M9 the night before and would go on to add M12 the following evening. (He also added M11 to his list at this time, although it had been previously discovered.)

With most binoculars, M10 looks like a relatively dim patch of grayish light set in a nice star field. To find it, first find the stars that outline the southern boundary of Ophiuchus's figure. The western end is marked by two stars -- Yed Prior [Delta (δ) Ophiuchi] and Yed Posterior [Epsilon (ε) Ophiuchi) -- while the eastern end is bounded by Sabik [Eta (η) Ophiuchi]. The constellation's perimeter kinks a little to the south, to the star Zeta (ζ) Ophiuchi. The line turns into a diamond if you imagine a second line from the two Yeds to Sabik by way of the faint star 23 Ophiuchi. M10 lies 2° north of 23 Ophiuchi and 1° west of another faint star, 30 Ophiuchi.

M12 should also be visible in the same field of view. Study them both for similarities and differences. You might find that M12 appears just a bit smaller than M10, but otherwise, they are twins. In reality, M12, at 17,600 light years, is a third farther away from us than M10, which is believed to lie at 13,400 light years. Although it appears slightly smaller than M10, in reality M12 is actually larger in diameter.

5. M62, Garden Trowel, and Hockey Stick



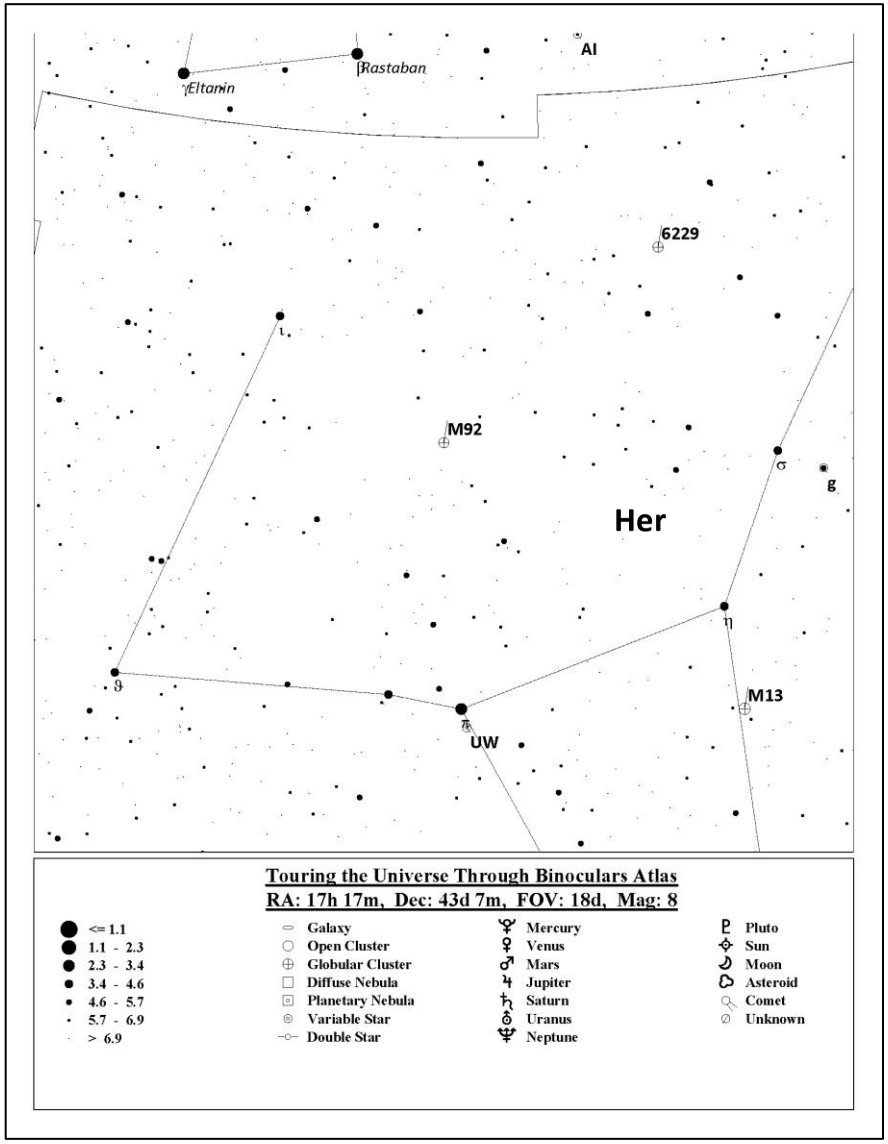
Globular cluster **M62** lies in a rich region of Ophiuchus about 8° southeast of Antares. If you're using 7x to 10x binoculars, place Antares just outside the northwestern edge of the field and then look along the opposite edge for a small, slightly fuzzy "star." That'll be M62. It lies just south of a close-set pair of 8th-magnitude stars, so don't confuse one for the other. That "little fuzz" represents the combined effort of some 150,000 stars seen at a distance of 22,200 light-years. In 2013, astronomers discovered a stellar-mass black hole within M62, one of the first found in a globular cluster.

This region also holds a pair of asterisms visible through our binoculars. Both were created by the imaginative mind of the late Massachusetts amateur John Davis.

The first is the **Garden Trowel**, found just to the southwest of M62. A trio of 7th-magnitude stars pointed southward form the trowel blade, while another four or so create its northward-meandering handle. Most of the Trowel's stars are white, but a couple shine with a subtle golden glint.

Another Davis creation, the **Hockey Stick**, lies 7° northwest of the stars Shaula [Lambda (λ) Scorpii] and Lesath [Upsilon (υ) Scorpii] at the tip of the scorpion's tail. Look for a north-south line of four equally spaced 7th-magnitude stars about 3° to the northwest. A fifth sun 45° southwest of the line forms the stick's blade. The hockey stick and tail stars easily squeeze into the same 7° field of my 10x50s, along with the spectacular open clusters M6 and M7 to the east. What a view!

6. M92

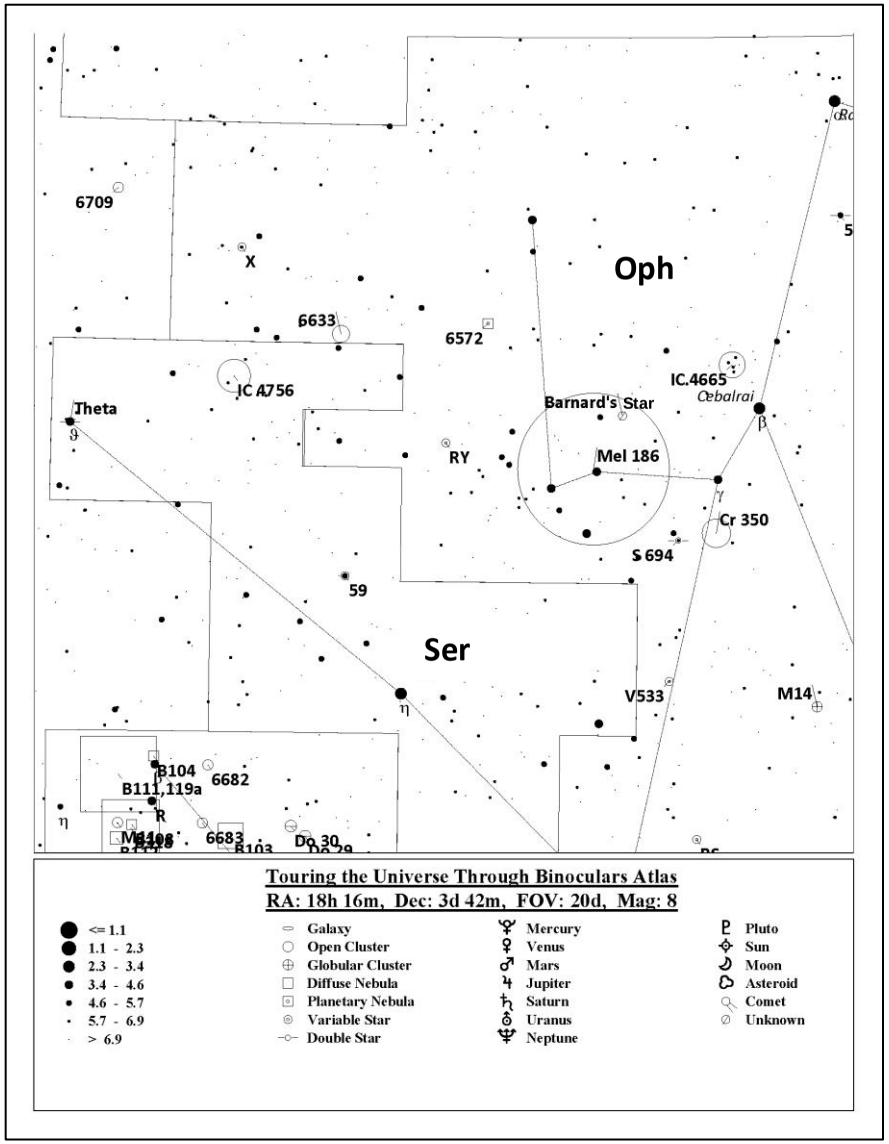


Sure, you know about M13, the Great Hercules Globular Cluster, but have you ever seen the constellation's second globular, **M92**? To spot it, aim along the northern side of the Keystone, marked by the stars Eta (η) and Pi (π) Herculis. Both ought to just squeeze into your field of view. Look for a close-set pair of fainter stars to their north, which with Eta and Pi, make a fairly conspicuous right triangle. From that fainter pair, which collectively mark the triangle's right angle, head north-northeast about half a field (3°) to M92.

At magnitude 6.3, M92 is one of the brightest globular clusters in the Milky Way. In fact, if it is clear enough this weekend, it might even be visible to the naked eye. Through binoculars, M92 will show as a misty, little glow accented with a brighter central core. Both it and M13 might just squeeze into the same field of wide-angle binoculars, affording an interesting comparison.

Based on spectroscopic studies of its stars, we know that M92 is one of the oldest globulars. That's because the predominant elements in its stars are hydrogen and helium, with only traces of heavier elements. Why? Because when those stars formed, heavier elements didn't exist yet in any abundance. They were created later, after other stars evolved and seeded the universe.

7. Barnard's Star, NGC 6633, IC 4756



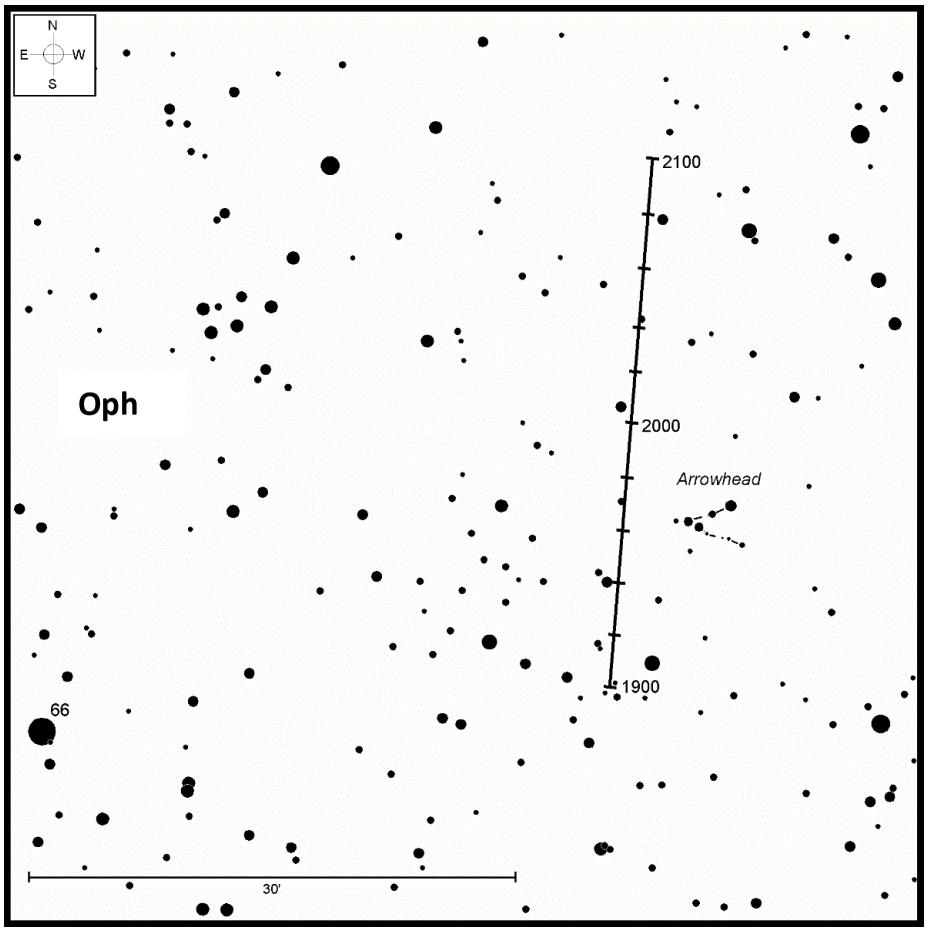
Measuring half a degree in diameter - as large as the Full Moon - **NGC 6633** shines at 5th magnitude. That makes it easy to spy through even pocket-sized mini binoculars. In all, 30 stars form this striking group. The brightest shine at 8th magnitude.

IC 4756 lies between NGC 6633 and Theta (θ) Serpentis in the constellation Serpens (Cauda). Covering an area twice that of its neighbor, IC 4756 may go completely unnoticed through conventional telescopes because of its size. But aim a modest binocular its way and suddenly you'll see the blended mist of fifty 9th- and 10th-magnitude suns. The brightest shines at magnitude 6.4 and lies toward the group's southeast edge.

IC 4756 carries the nickname Graff's Cluster, after German astronomer Kasimir Graff, who independently discovered it in 1922. He was not the first to notice the cluster, however. Many credit its discovery to American astronomer Solon Bailey, who identified it on photographs taken at Harvard College's Arequipa station in Peru. But even he wasn't first to publish an account of IC 4756. That goes back to 1859, when the Rev. Thomas Webb mentioned in his classic book Celestial Objects for Common Telescopes that "between [NGC 6633] and Theta, nearer the former, is a beautiful large cloud of stars, chiefly 8 and 9 magnitude."

See the next page for info on Barnard's Star.

7a. Barnard's Star close-up

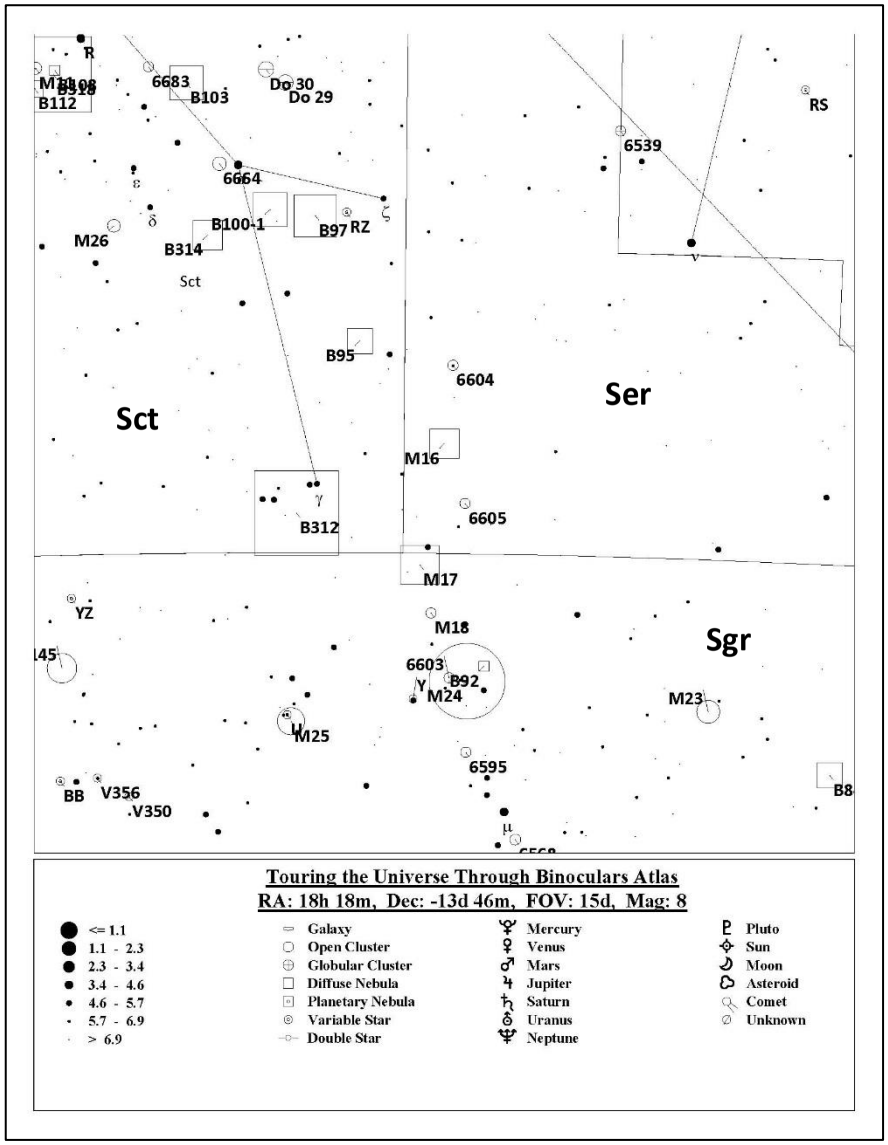


Barnard's Star, named after the American astronomer Edward Emerson Barnard, is a 9th-magnitude red dwarf in Ophiuchus. Barnard's Star looks like just another faint point, except for one thing: its proper motion is the fastest of any star ever found. Proper motion is the apparent angular movement that an object shifts against the background celestial sphere over time.

I've glimpsed Barnard's Star through my 10x50s from Stellafane in the past, but giant binoculars are your best bet.

Use this close-up chart to zero in on Barnard's Star. First, look for 5th-magnitude 66 Ophiuchi along the eastern (left) edge of the chart. Aim your binoculars there, and then look toward the opposite side for an arrowhead-shaped asterism of faint stars that points eastward. Barnard's Star lies less than 10 arc-minutes to the arrow's northeast, near an 11th-magnitude sun. Although the asterism is dimmer than our target, Barnard's Star is less than 10 arc-minutes to the arrow's northeast. Good luck!

8. M16 (open cluster within the Eagle Nebula)



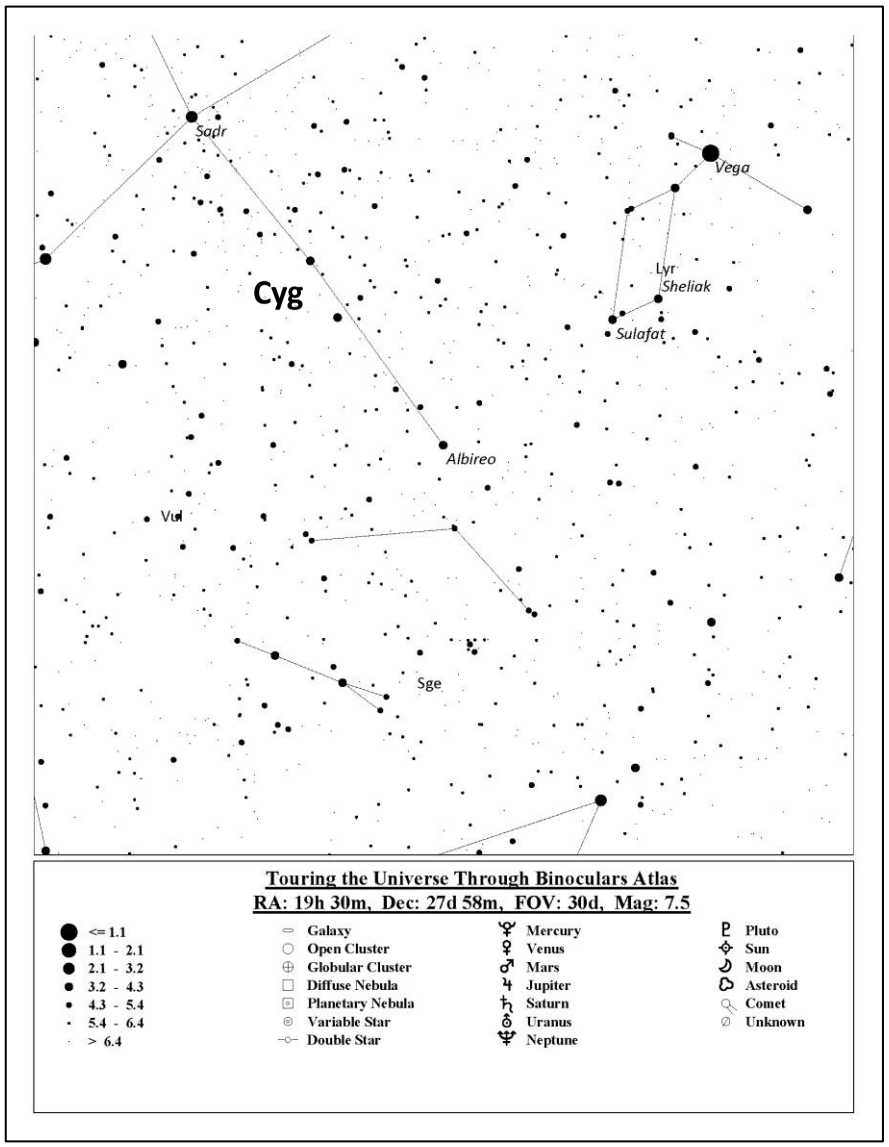
M16 was first eyed by Swiss observer Phillippe Loys de Chéseaux in 1746 and independently found by Messier on the busy night of June 3, 1764. Messier described a "Cluster of small stars, mingled with a faint glow." True, the stars of M16 are mingled with the faint glow of ionized hydrogen – the so-called Eagle Nebula – but Messier did not see that. Instead, his description points to stars too faint for his telescope to resolve. The nebula that today we call the Eagle Nebula was not discovered until 1895 by Edward Barnard. It was subsequently cataloged separately as IC 4703.

The view through binoculars matches Messier's words very closely. With my 10x50s, I can count about a dozen stars against the unresolved glow of fainter suns. With my 25x100 giants and nebula filters held between eyepieces and eyes, I can catch hints of the nebula itself, but only on the best nights.

Studies show that M16 is one of the youngest star clusters known, perhaps no more than five million years old, affording astronomers an excellent laboratory for study. Its hottest stars, spectral type O, are seven times hotter than our Sun. M16 is estimated to be 5,600 light years away.

M16 (actually, IC 4703) captured the public's imagination when the Hubble Space Telescope's "Pillars of Creation" photograph was released in 1995. This has to be one of the most dramatic views of the Universe captured in recent years.

9. Albireo [Beta (β) Cygni]

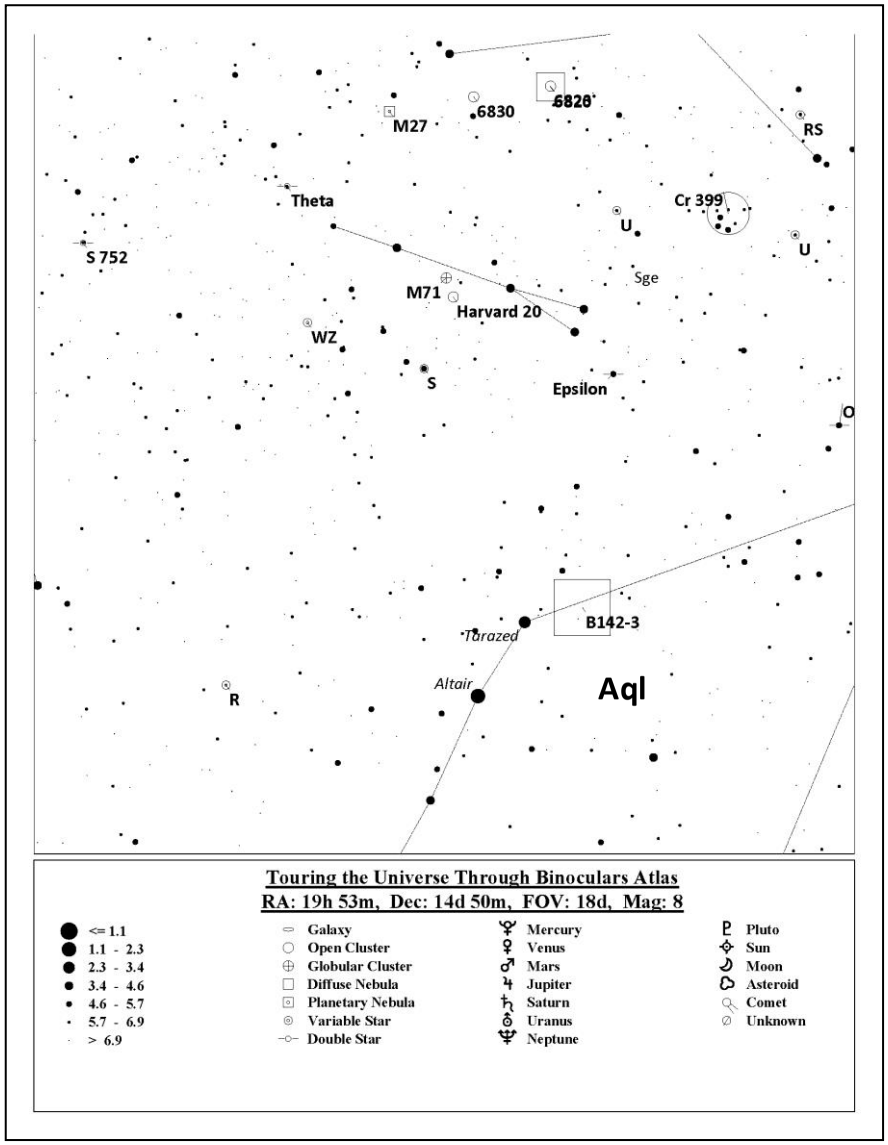


Cygnus is one of my favorite binocular playgrounds. Even from my moderately light-polluted suburban backyard, I can sit back on a chaise lounge, peer through my modest 10x50 binoculars, and trace the gentle glow of the Milky Way from Deneb southward toward the star **Albireo**, which marks the bird's beak.

Albireo is a showpiece double star through small telescopes, with a 3rd-magnitude golden primary paired with a 5th-magnitude sapphire-blue companion. Although their colors are not as dramatic through most common size binoculars, both stars can be spotted through steadily held 10x50s. My 16x70s, however, have enough magnification to show the true colors of Albireo's golden primary sun and blue companion.

The jury is still out as to whether or not Albireo is a true binary star system or just a chance line-of-sight alignment. Recent results from the European Space Agency's Gaia mission announced that both stars were between 330–390 light years away. Problem is, noise in the astrometric data muddied the results, making it difficult to determine whether the stars are physically associated. Stay tuned.

10.Barnard 142-143 (Barnard's E) and M71



One of the more visually interesting dark nebulae within Aquila carries the dual designation of **Barnard 142 and Barnard 143**, for its multiple entries in Edward Barnard's Catalogue of 349 Dark Objects in the Sky.

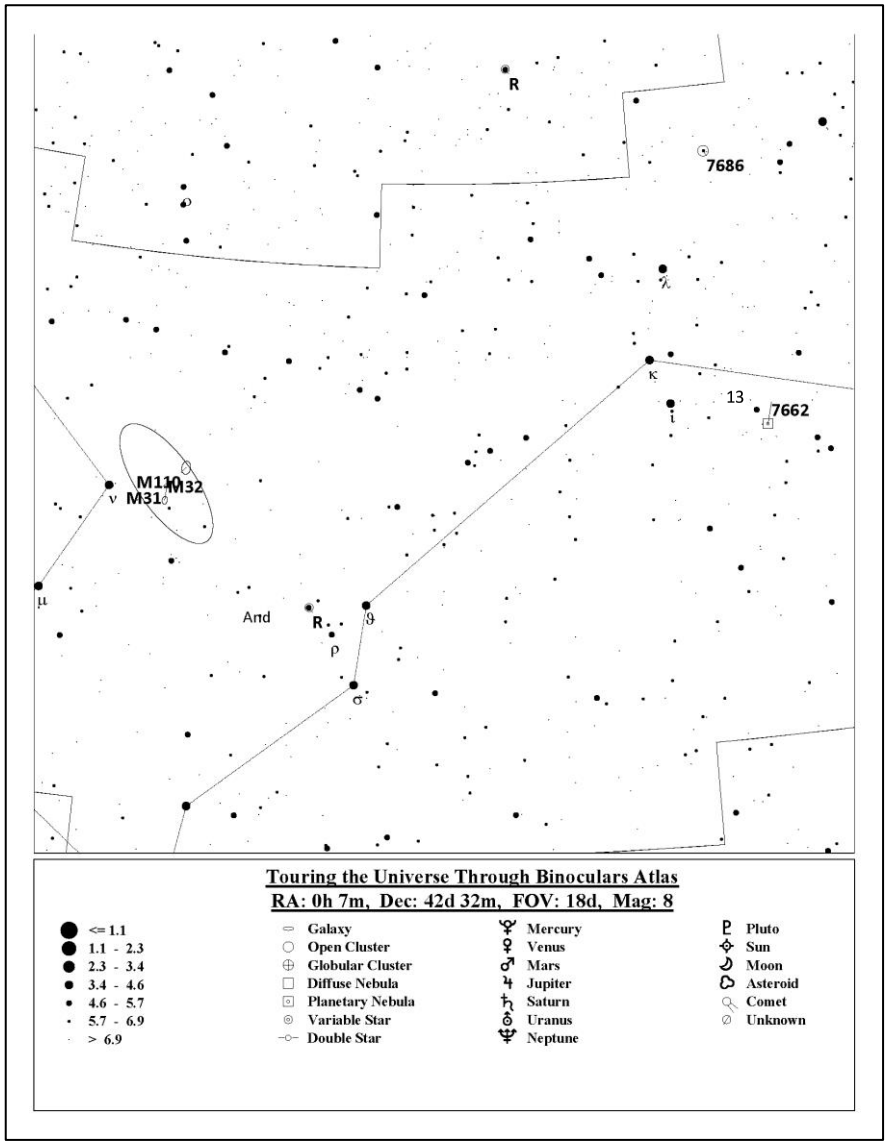
The human mind always likes to create something that is tangible out of the intangible. Though included as two separate items in Barnard's listing, recent reckonings often lump both together for their combined visual interest. Today, Barnard 142 and 143 are better known as "**Barnard's E**." That's because from under dark skies, they collectively form a very distinctive capital E against the bright background.

Barnard's E, also sometimes called the Triple Cave Nebula, is easy to locate in the sky just 3° northwest of brilliant Altair and 1° due west of Tarazed [Gamma (γ) Aquilae]. A few Stellafanes ago, the E struck me as especially vivid when I pointed my 10x50s its way. The effect, however, was lost through my 16x70 binoculars, probably because of their narrower field of view.

M71, buried within the Arrow, Sagitta. Since its discovery in 1775 by Philippe Loys de Chéseaux of Switzerland, M71 has proven to be a difficult object to classify. Many older references designated it as a very dense open cluster similar to M11 in Scutum, but most modern authorities agree it is a globular.

Regardless of its true nature, binoculars disclose only a subtle glow set amid a very pretty field of glittering stardust.

11.NGC 7662 (Blue Snowball)

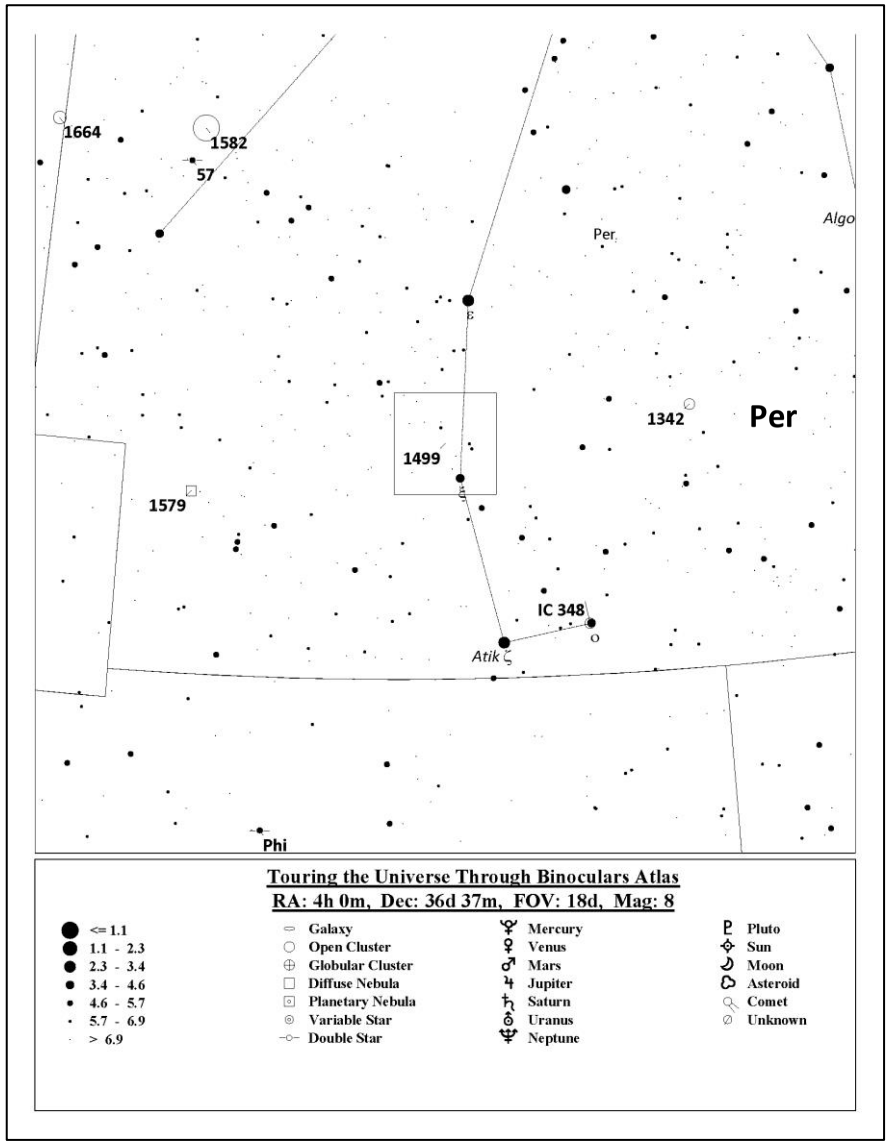


Discovered by William Herschel in 1784, NGC 7662 lies in the western portion of the constellation Andromeda.

To find it, scan the area for three 4th-magnitude stars: Lambda (λ), Kappa (κ) , and Iota (ι) Andromedae. They form a bent row lined up roughly north-to-south, some 16° north-northwest of Alpheratz [Alpha (α) Andromedae], the star shared by Andromeda and the Great Square of Pegasus. From Iota at the southern end of that row, you should spot 6th-magnitude 13 Andromedae about 2° further west. NGC 7662 awaits less than half a degree to 13's southwest.

The planetary's colorful appearance through telescopes led to its popular nickname, the Blue Snowball. While it will appear stellar through binoculars, its namesake tint is detectable with careful scrutiny. Securing your binoculars to steady the view will definitely help. Also try another trick by softening the focus ever so slightly. Both will help to enhance its subtle coloring.

12.NGC 1499 (California Nebula)



I've saved this year's most difficult object for last. Nicknamed the California Nebula for its likeness in long-exposure photographs to the Golden State's outline, NGC 1499 puts even the most experienced observers to the test. But it's not that it is difficult to locate. NGC 1499 lies just northeast of 4th-magnitude Xi (ξ) Persei . No, the problem is one of size -- too much of a good thing, I'm afraid. From tip to tip, NGC 1499 measures 2.5° long and 3/4° wide. Add to that the fact that, like so many clouds of glowing hydrogen, NGC 1499's surface brightness is incredibly low because its primary emissions are restricted to the red portion of the visible spectrum. Our eyes are very poor red receptors in dim lighting. Even contrast-enhancing filters -- Hydrogen-Beta are the best -- it's a tough catch.

So, let's talk strategy. The California Nebula is easy to pinpoint thanks to Xi Per, just 1° to its south. But that star, which is the ionizing energy source for the nebula's glowing hydrogen, is both a blessing and a curse. While Xi makes zeroing in on the nebula a snap, its light can easily overwhelm the nebula's weak glow. That is why knowing *how* to look for low-surface-brightness objects is just as important as knowing *where* to look. By mounting your binoculars on a tripod or other support, the star can be moved out of view, extinguishing its interfering presence and improving the odds.

Using averted vision, start with the slightly brighter northeastern edge of the cloud, opposite Xi, and then trace out the nebula's "Pacific coast." Its glow is very dim, but the long, slender profile is unmistakable once you realize the shape and size. Several superimposed stars remind me of lights from distant cities. The brightest, a 6th-magnitude sun, lies just offshore about where San Francisco would be, and marks a crook in the coastline.