
# Binocular Observing Olympics III

Stellafane 2021 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. | M94 | CVn | 1 | Gx | 12h 50.9m | +41° 07′ | 9 | 14'x12' | Cat's Eye Galaxy |
| | 2. | M80 | Sco | 2 | GC | 16h 17.0m | -22° 58′ | 7.3 | 10′ | |
| | 3. | M19 | Oph | 3 | GC | 17h 02.6m | -26° 16′ | 6.8 | 17′ | |
| | 4. | Barnard 92 | Sgr | 4 | DN | 18h 15.5m | -18° 13' | -- | 15'x9' | The Black Hole |
| | 5. | Barnard 93 | Sgr | 4 | DN | 18h 16.9m | -18° 04' | -- | 8'x3' | |
| | 6. | M55 | Sgr | 5 | GC | 19h 40.0m | -30° 58′ | 6.3 | 19′ | |
| | 7. | M56 | Lyr | 6 | GC | 19h 16.6m | +30° 11′ | 8.4 | 9' | |
| | 8. | Alpha (α) Cap | Cap | 7 | ** | 20h 17.6m | -12° 30' | 3.6,4.2 | 6' | Algedi |
| | 9. | M15 | Peg | 8 | GC | 21h 30.0m | +12° 10′ | 6.3 | 18′ | |
| | 10. | NGC 7293 | Aqr | 9 | PN | 22h 29.6m | -20° 50' | 6.5 | 16'x12' | Helix Nebula |
| | 11. | Davis' Airplane | Cas | 10 | AS | 23h 20.6m | +62° 12' | -- | 60'x45' | |
| | 12. | M52 | Cas | 10 | OC | 23h 24.8m | +61° 36' | 6.9 | 12' | Cassiopeia Salt-and-Pepper |
| | 13. | Neptune | Aqr | 11 | ♆ | 23h 34.1m | -04° 03' | 7.8 | 2" | |
| | 14. | M110 | And | 12 | GX | 00h 40m | +41° 41' | | | M31 satellite |
| | 15. | M32 | And | 12 | GX | 00h 43m | +40° 52' | | | M31 satellite |
| | 16. | M31 | And | 12 | GX | 00h 43m | +41° 16' | | | Andromeda Galaxy |
| | 17. | NGC 457 | Cas | 13 | OC | 01h 19.6m | +58° 17' | 6.4 | 13' | Owl (or ET) Cluster |
| | 18. | Golf Putter | And | 14 | AS | 01h 53m | +37° 19' | -- | 60' | |
| | 19. | NGC 752 | And | 14 | OC | 01h 57.8m | +37° 51' | 5.7 | 49′ | Golf Ball Cluster |
| | 20. | Melotte 20 | Per | 15 | OB | 03h 24.3m | +49° 52' | 2.3 | 184' | Alpha (α) Per Association |

***Type:**

| | | | | | |
|---|---|---|---|---|---|
| ** | Double star | GC | Globular cluster | OC | Open star cluster |
| AS | Asterism | GX | Galaxy | ♆ | Neptune |
| DN | Dark nebula | OB | Stellar association | 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.

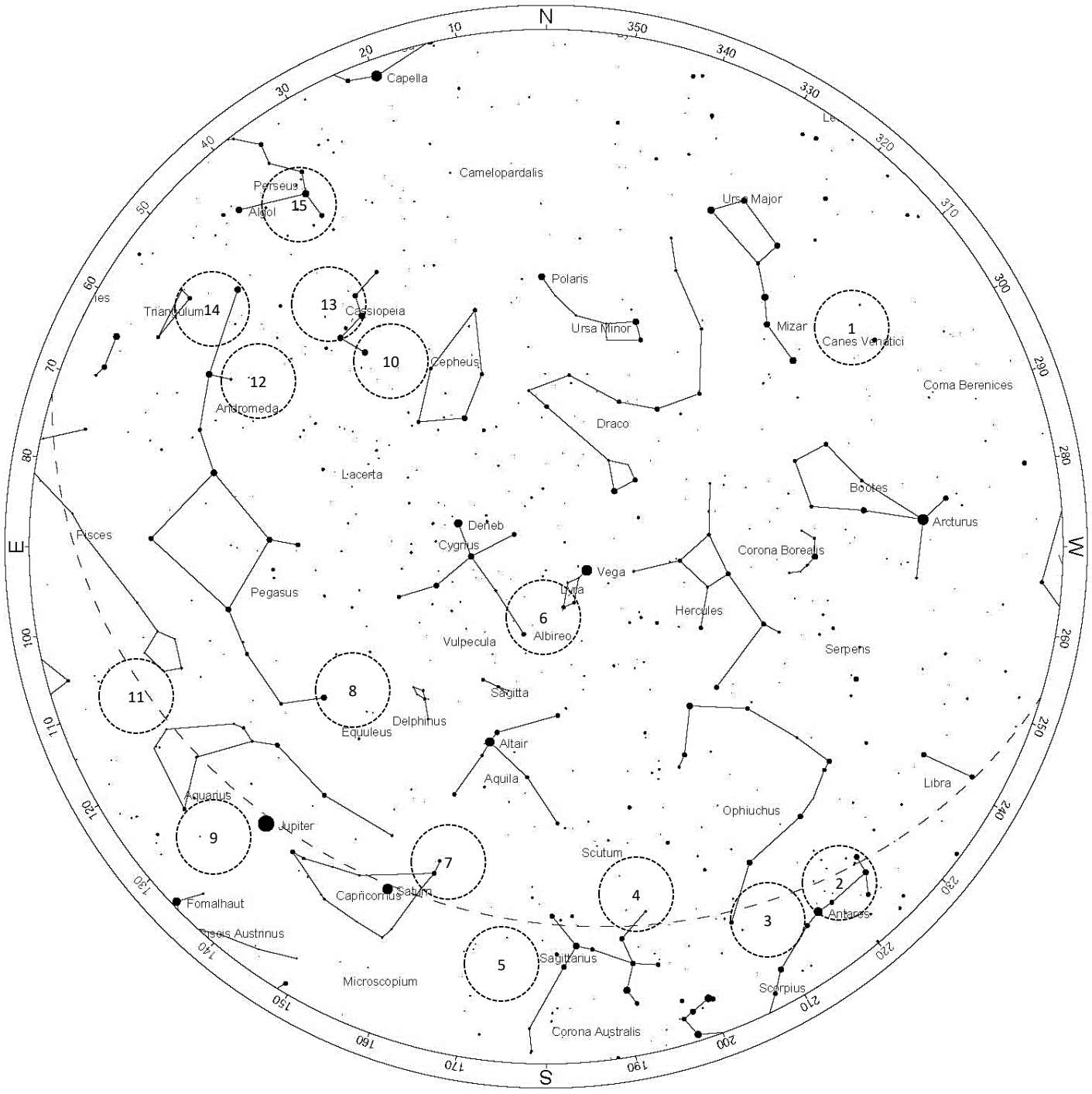
**How did you make out with this year's list? And would you like to see a new BOO 2022 list next year? Drop me a line via my web site, philharrington.net, and let me know.**

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

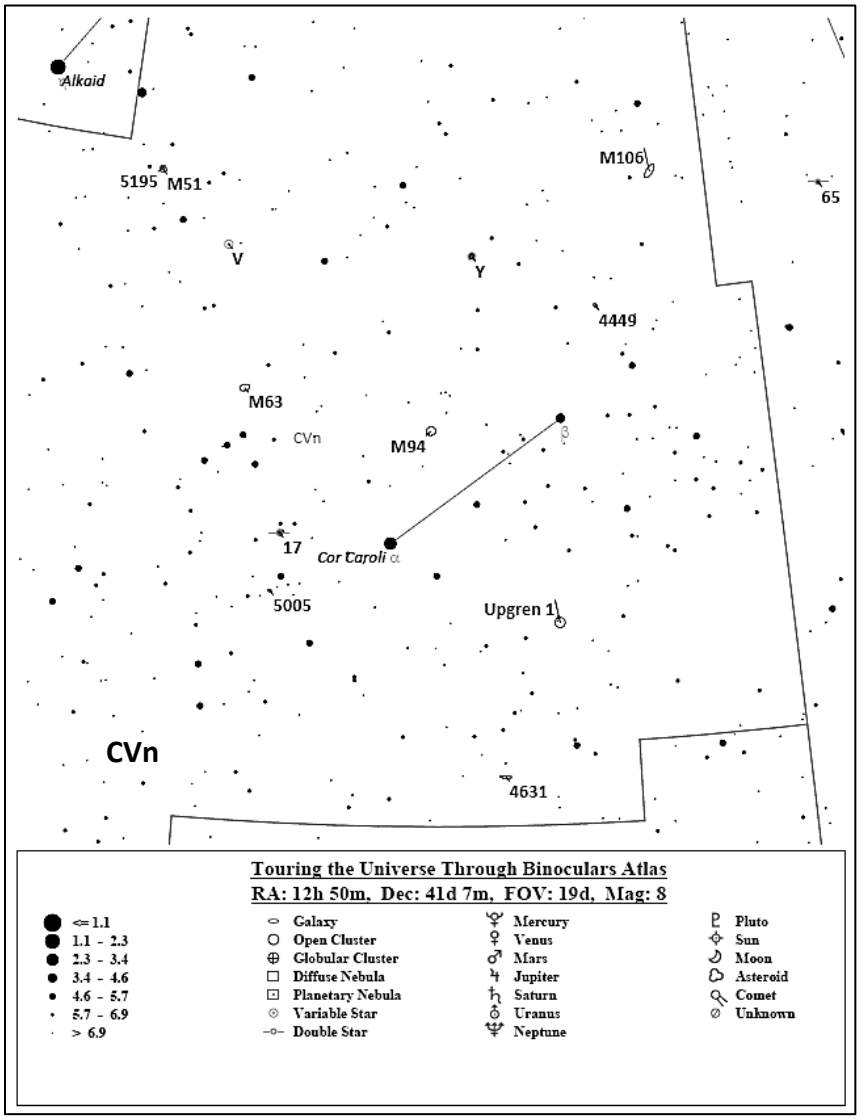
# All-Sky Star Chart

(chart drawn for 11:00 PM)

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



## 1. M94 (Cat's Eye Galaxy)

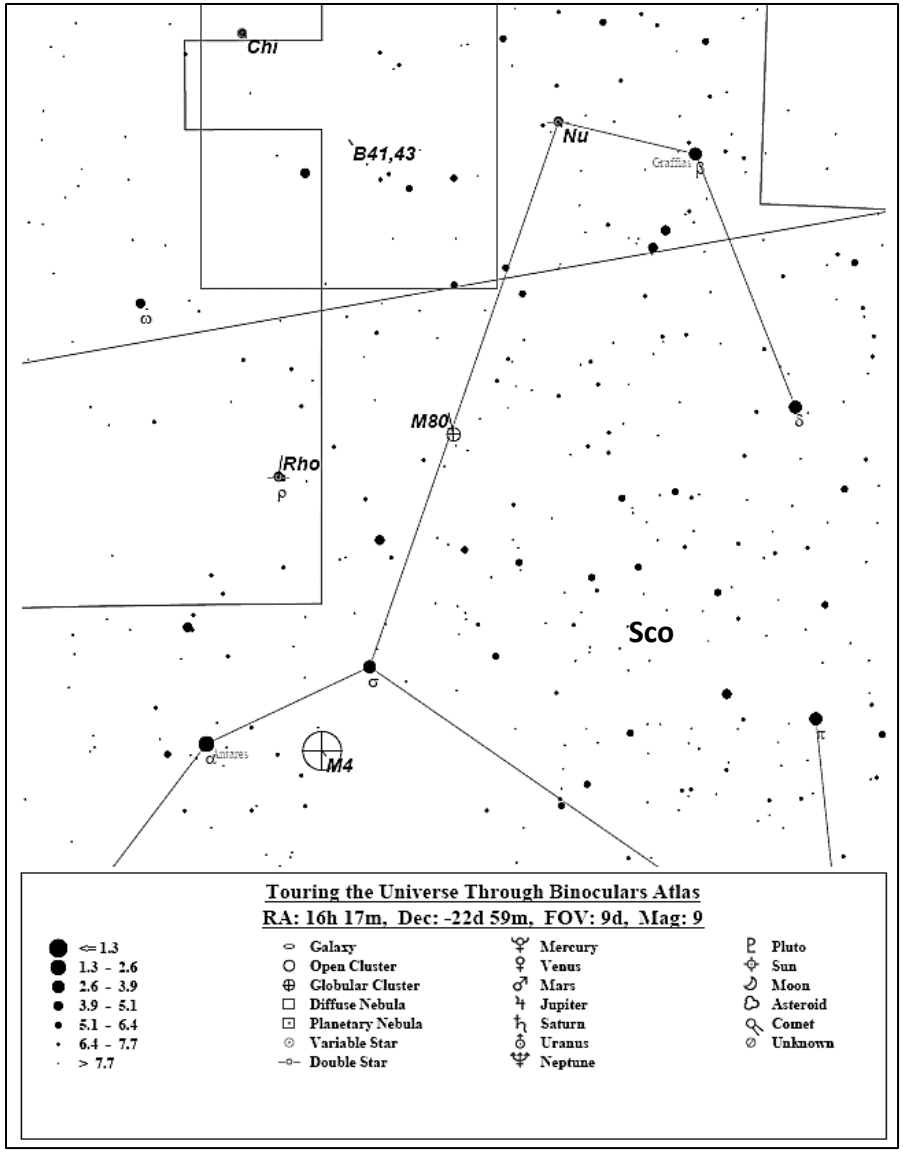



The area south of the Big Dipper's handle is occupied by the constellation Canes Venatici, supposedly a pair of hunting dogs, created from just two easily visible stars, Cor Caroli (Alpha [α] CVn) and Chara (Beta [β] CVn).

Cor Caroli and Chara are separated in our sky by 5°, close enough to squeeze into the same 10x binocular field. Just south of an imaginary line connecting them, you'll see 6th-magnitude 10 Canum Venaticorum, a type G star. But to the line's north, about 3° due east of Chara, you might also spot a small, faint blur of grayish light. That's the 8th-magnitude spiral galaxy M94.

Nicknamed the Cat's Eye Galaxy or Croc's Eye Galaxy for its appearance in photographs, M94 is seen nearly face-on from our perspective. As spirals go, it is small, a bit more than half the size of our Milky Way in diameter. Despite its modest dimensions, M94 packs a punch. It is also classified as a starburst galaxy, where internal density waves are compressing interstellar matter into protostars more vigorously than typical spirals.

## 2. M80

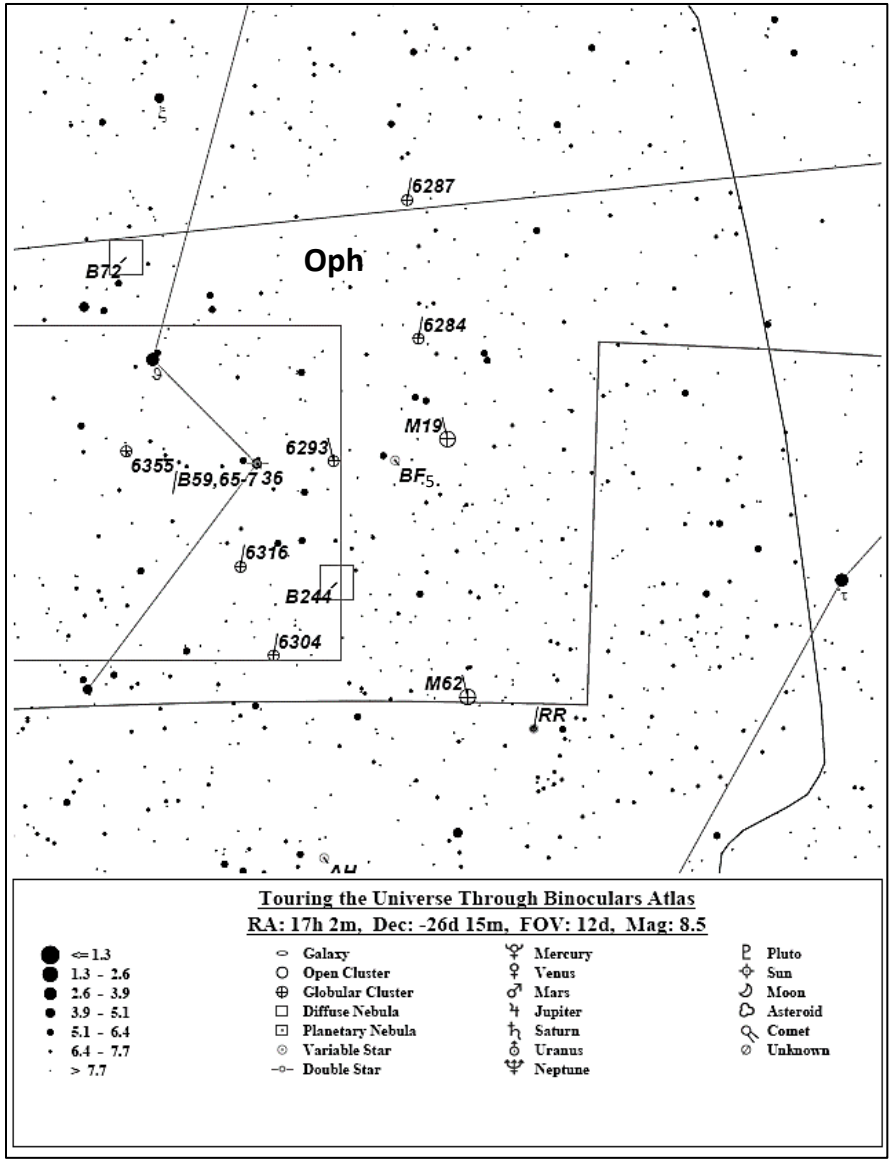



To find M80, scan 4.5° northwestward through your binoculars from Antares to a position just east of the halfway point between Sigma (σ) and Nu (ν) Scorpii, in the Scorpion's head. There, we find M80 nestled among faint field stars and framed by Sigma and Nu still in the field of most 10x and lower power binoculars

Discovered by Messier on a winter's morning in January 1781, M80 shines at 7th magnitude and appears about one-third as large as M4, Scorpius' brighter globular. In reality, however, M80 is both larger and more concentrated. It's just farther away, at more than 32,000 light years from us. Binoculars reveal a perfect sphere focusing to a brighter central core.

Buried within M80's several hundred thousand stars are many so-called "blue stragglers." These blue giant stars appear much younger than other cluster members, seemingly defying the cluster's overall age. Studies conclude that these stars may have lost their cooler outer shells in close encounters with other stars, thereby exposing hotter inner layers.

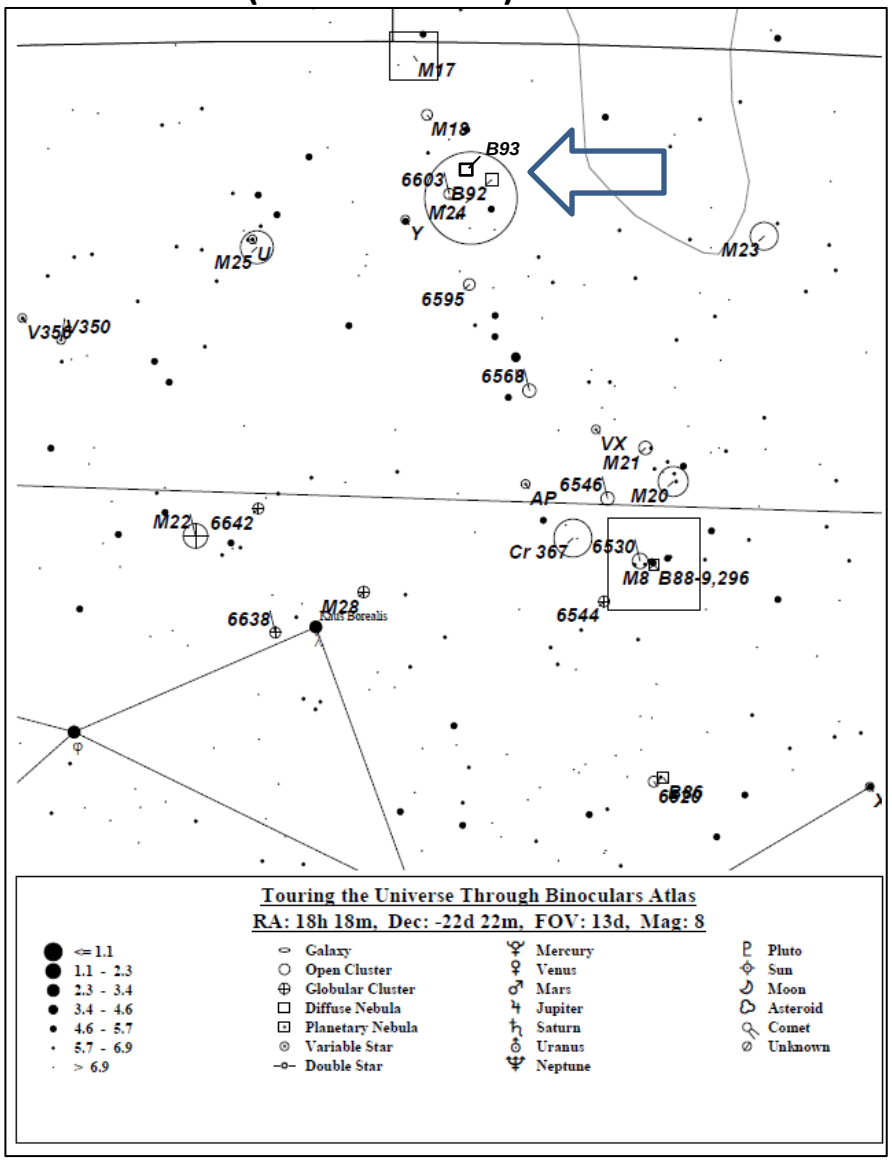
## 3. M19




Place Antares at the western edge of your binocular field and look on the opposite side for a close-set pair of 5th-magnitude stars, lying across the invisible border in Ophiuchus. The globular cluster M19 lies just a degree to their south. Looking a little larger and a little brighter than M80, M19 should reveal itself as a slightly fuzzy "star" through 7x binoculars.

While viewing M19 through his 10x50 binoculars, amateur Jim Elliott from Lee County, NC, once pointed out that there is an unusual arc of three optical double stars curving around M19 to the northeast. I call this curious assembly of stars, which include BF, 24, 26 and 36 Ophiuchi, the "Dish O' Doubles," since they remind me of a satellite dish, with M19 at the focus.

## 4. Barnard 92 (The Black Hole) and Barnard 93



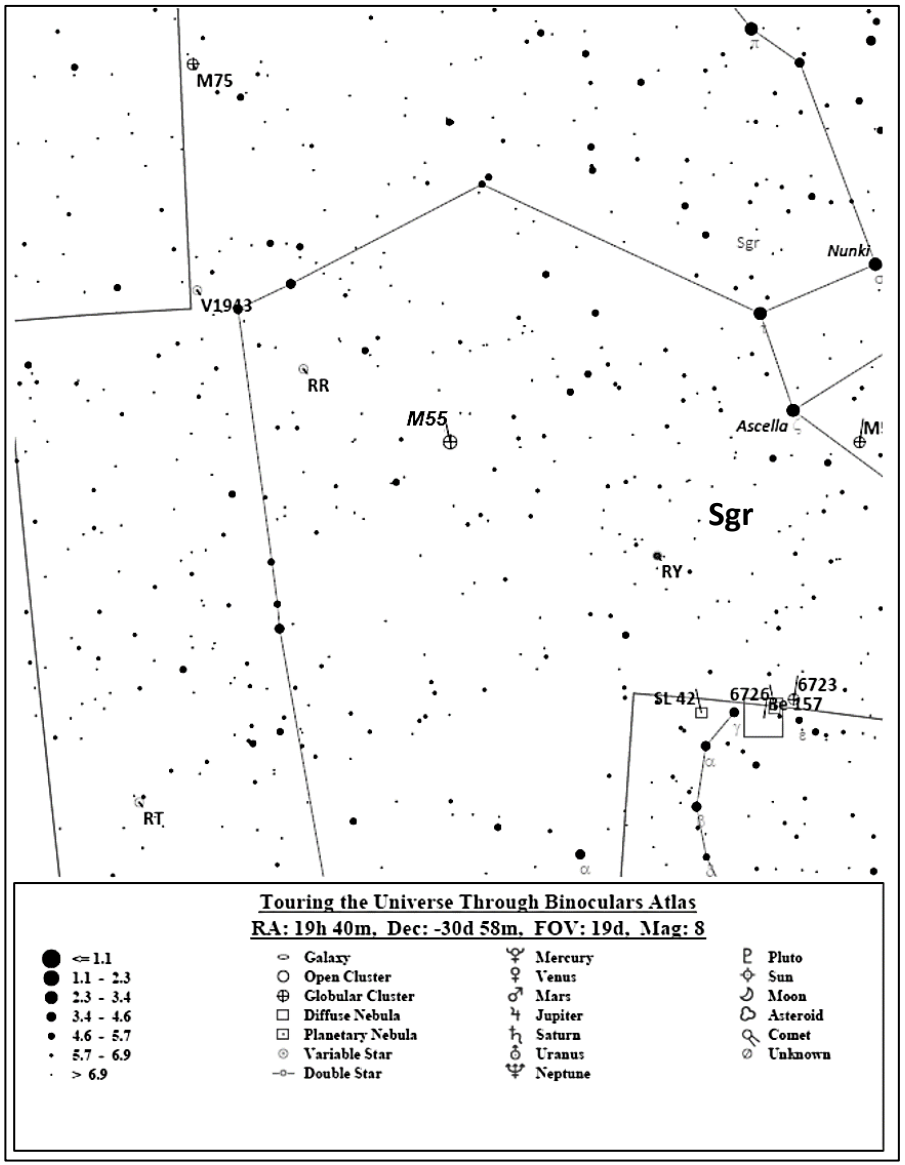

The Small Sagittarius Star Cloud (M24) is a bright portion of the Milky Way north of the Sagittarius Teapot.

There are several isolated patches of dark nebulosity silhouetted in front of M24. The most obvious is cataloged as Barnard 92 in Edward Barnard's paper "On the Dark Markings of the Sky with a Catalogue of 182 Such Objects," published in The Astrophysical Journal's January 1919 edition. Barnard's one-line description portrayed it as a "Black spot, 15' north and south, 9' east and west." That likely led to its nickname, the "Black Hole," coined long before the expression was applied to the end result of the most massive stars when they detonate as supernovae.

Barnard's "black spot" may be glimpsed with 30mm binoculars, growing more obvious as magnification and aperture climb. It does indeed look like an oval "black hole" oriented north-south through my 16x70s, appearing about half as large as our Moon.

If you spot B92, try your luck with the next catalog entry, Barnard 93, about 1/3° east of B92. But be forewarned, it's tougher. While B93 matches B92's size north-to-south, it appears less than half as wide east-to-west. Unlike B92, which has sharp edges that clearly define it from the surroundings, B93 slowly diffuses outward into its environs. In photographs, it looks like the silhouette of a northward facing comet with a denser "coma" and a fainter "tail" trailing southward.

## 5. M55



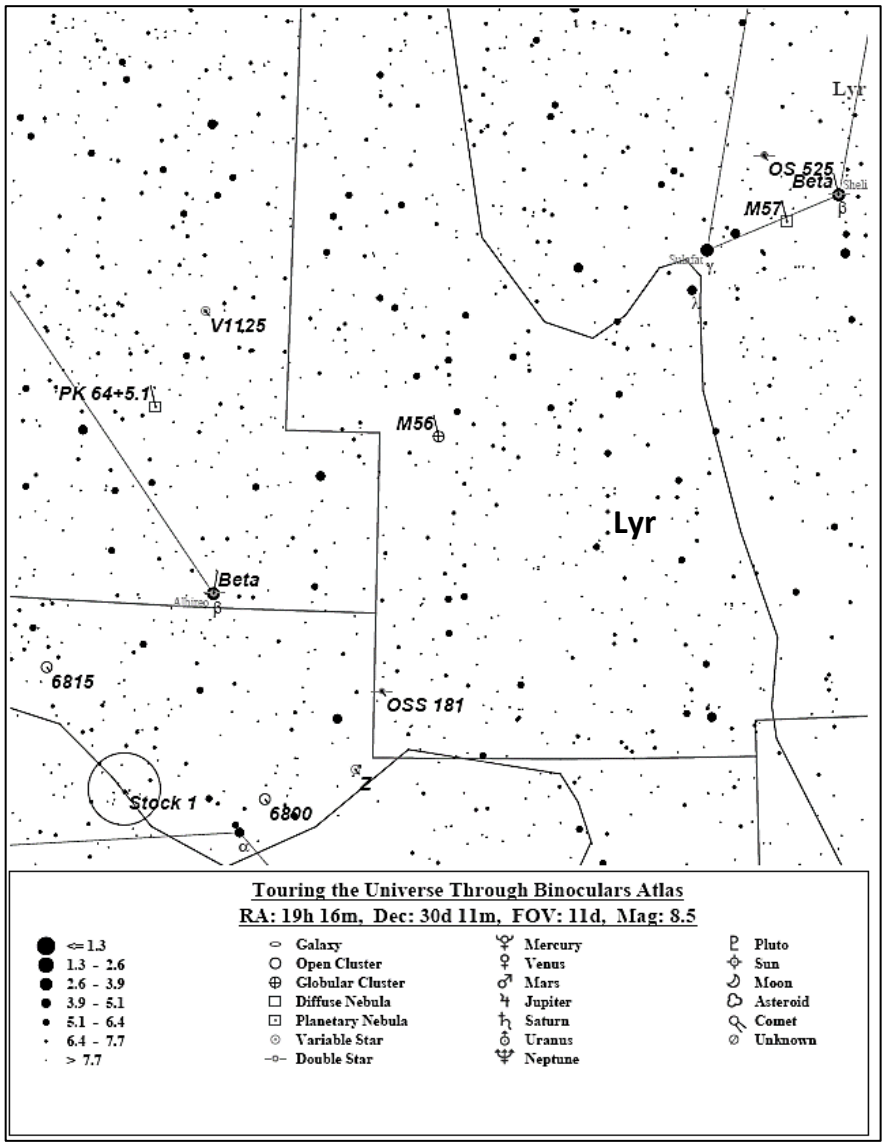

To find M55 in eastern Sagittarius, extend a line from the stars Nunki (Sigma [σ] Sagittarii) to Tau (τ) Sagittarii in the Teapot's handle. Following that line through your binoculars, you will first pass a small triangle of dim stars at about the halfway point to M55. Continue another finder field or so to the southeast to find M55, lying within a long, thin rectangle of 6th-magnitude stars.

One word of warning. Unlike other globular clusters, which appear highly concentrated, M55 is spread out more evenly. As a result, its surface brightness (or brightness per unit area) is deceptively low. So, don't be surprised if finding M55 is a little more difficult than you might expect at first.

Through binoculars, M55 appears as a dim ball of light. If you have sharp eyes and steadily held binoculars, you just might make out a bright point of light slightly off-center in M55. That lone star, shining at about 9th magnitude, is most likely a foreground object and not actually a member of the cluster.

M55 measures close to two-thirds the Moon's apparent diameter (or about 19 arcminutes). At a projected distance of 17,600 light years, this would correspond to an actual diameter of about 96 light years.

## 6. M56



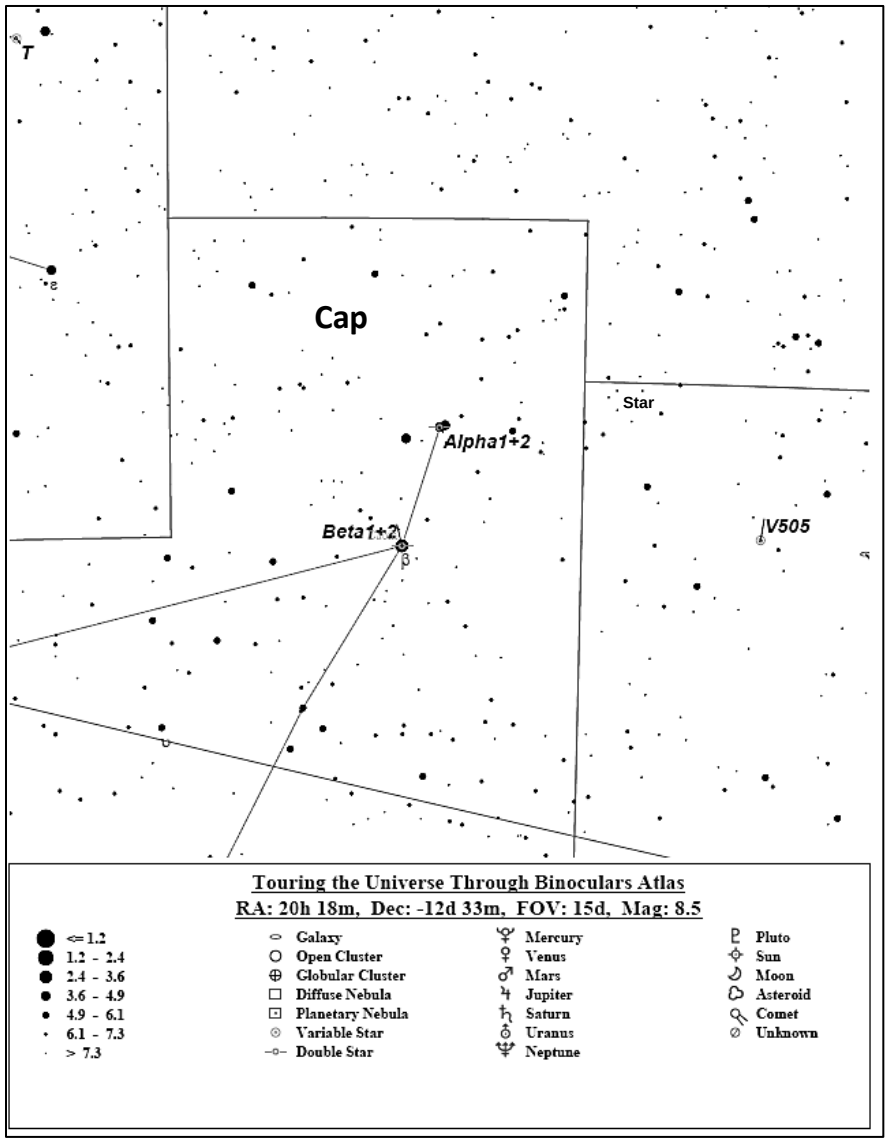

Globular cluster M56 is Lyra's unsung Messier object. You will find it about halfway between Sulafat (Gamma [γ] Lyrae) and Albireo (Beta [β] Cygni).

Begin at Albireo. Looking through your binoculars, move toward the northwest, pausing at the star 2 Cygni. From here, head a little west-northwest, toward the base of Lyra, but pause at a dim star directly south of a small triangle of dimmer stars. M56 is just to the southeast.

Sure, M57 may garner more press, but M56 is easier to identify through binoculars once it's in view. It will look like a distant ball of cotton nestled in a field strewn with stardust. It is easy to see how Charles Messier could have mistaken it for a dim comet when he discovered it in January 1779.

Lying about 33,000 light years away, M56 has an estimated age of 13.70 billion years.

## 7. Alpha (α) Capricorni (Algedi)



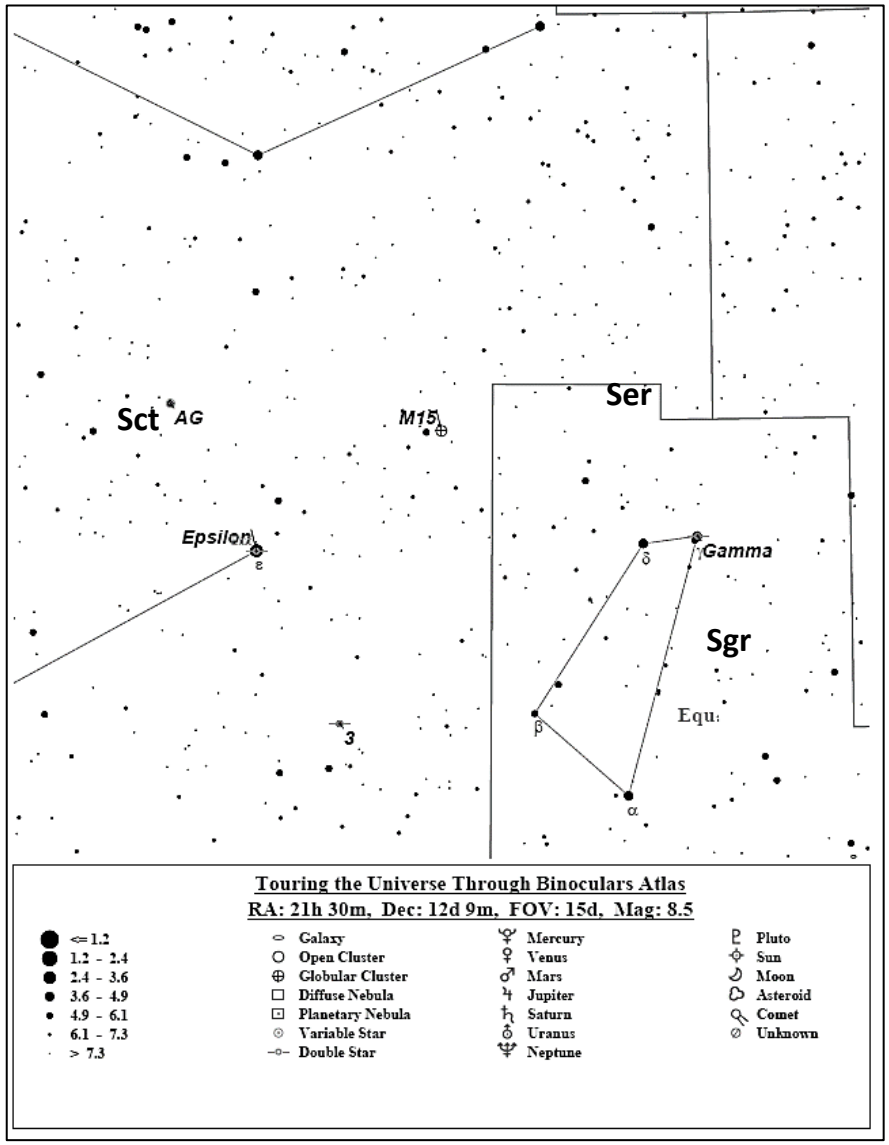

Algedi, or Alpha (α) Capricorni, is made up of two 4th-magnitude suns that are easy to resolve with the smallest pocket binocular, and even with the unaided eye given dark skies. They look like heavenly headlights spaced 6 arcminutes apart.

But looks can be deceiving. It turns out the pair is strictly a chance, line-of-sight coincidence. Algedi is a so-called "optical double," two close-set stars that are actually nowhere near each other in space. The yellow giant southeastern star, known as Alpha-2, is 109 light years from us, while Alpha-1, a yellow supergiant, is nearly seven times further away.

Bonus object:
Dabih or Beta (β) Capricorni, is just 2° south of Algedi. It easily fits into the same field of view. While Algedi's two stars appear identically bright, Dabih's twosome look noticeably different. The brighter sun, called Dabih-Major, shines at 3rd magnitude, while its companion, Dabih-Minor, is 16 times fainter at 6th magnitude. Both form a physical system 330 light years away, with each separated from the other by about a third of a light year. It takes approximately 700,000 years for the pair to orbit one another.

There is much more to Dabih than meets the eye. Studies show that both stars are themselves accompanied by fainter companions that go unseen through binoculars. Dabih is at least a quintuple system.

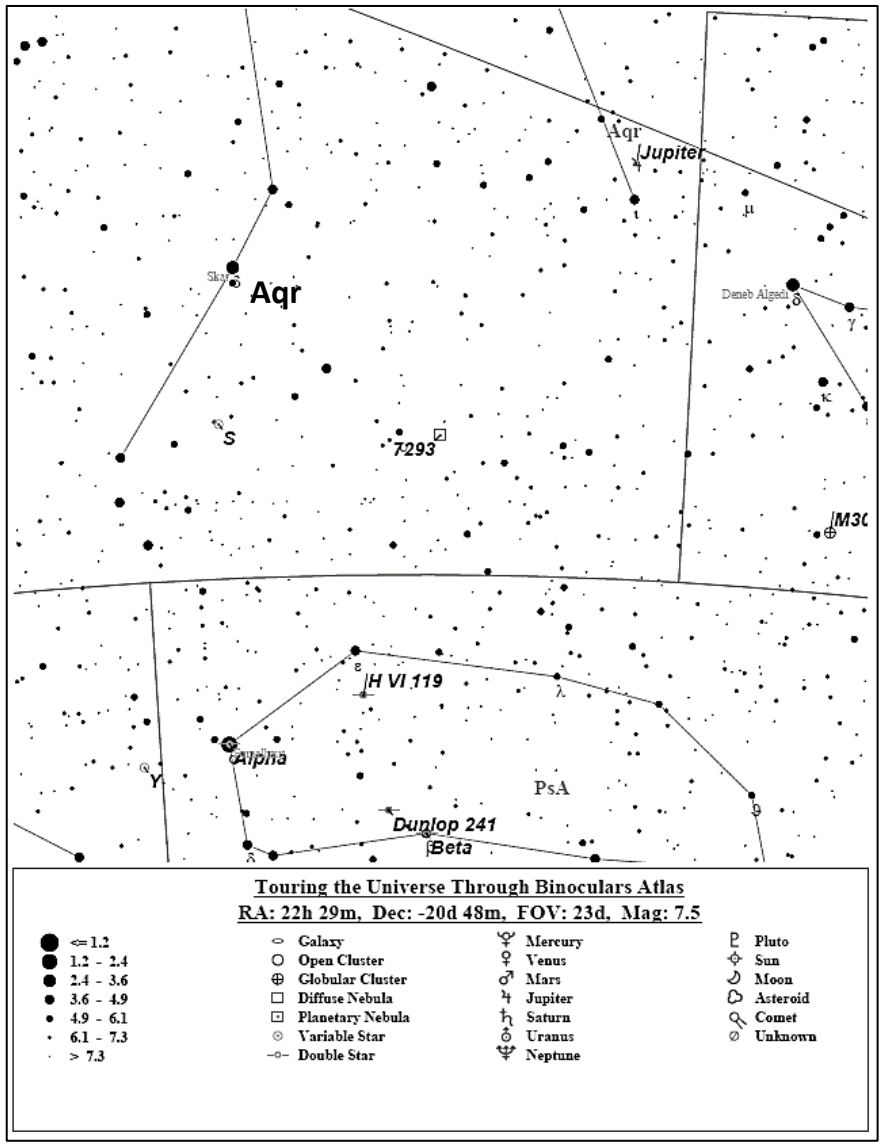
## 8. M15




M15 floats just 4° northwest of Enif, and so should fit into the same field of view. In Messier's words, M15 is a "nebula without a star… it is round, in the center it is brilliant." This is an apt description through modern binoculars, as well. None of its 100,000 or more stellar denizens are resolved through binoculars, although I get a sense of "graininess" when I look at it through my 25x100 giants.

M15 holds a hidden treasure that our binoculars, and most telescopes, miss but is still interesting to ponder as we gaze its way. Back in 1927, American astronomer Francis Pease spotted something unusual in a photograph of M15 that had been taken with the 100-inch Hooker reflector at Mount Wilson Observatory in California. In his report published the following year in the Publications of the Astronomical Society of the Pacific, Pease reported that "through the 'Pulkowa ultra-violet' color filter, the star Küstner No. 648…appeared very bright as compared with the surrounding stars." Those surrounding stars appeared identical to Küstner 648 in visible-light images, which triggered Pease's curiosity. Up to this point, Küstner 648 was thought to be just another star cataloged by German astronomer Friedrich Küstner. But Pease's results were unmistakable. He had discovered that Küstner 648 was no star at all; it was a planetary nebula. Now cross-listed as Pease 1, this was the first planetary nebula ever discovered within a globular cluster. Even today, nearly a century later, only three others are known.

## 9. NGC 7293 (Helix Nebula)

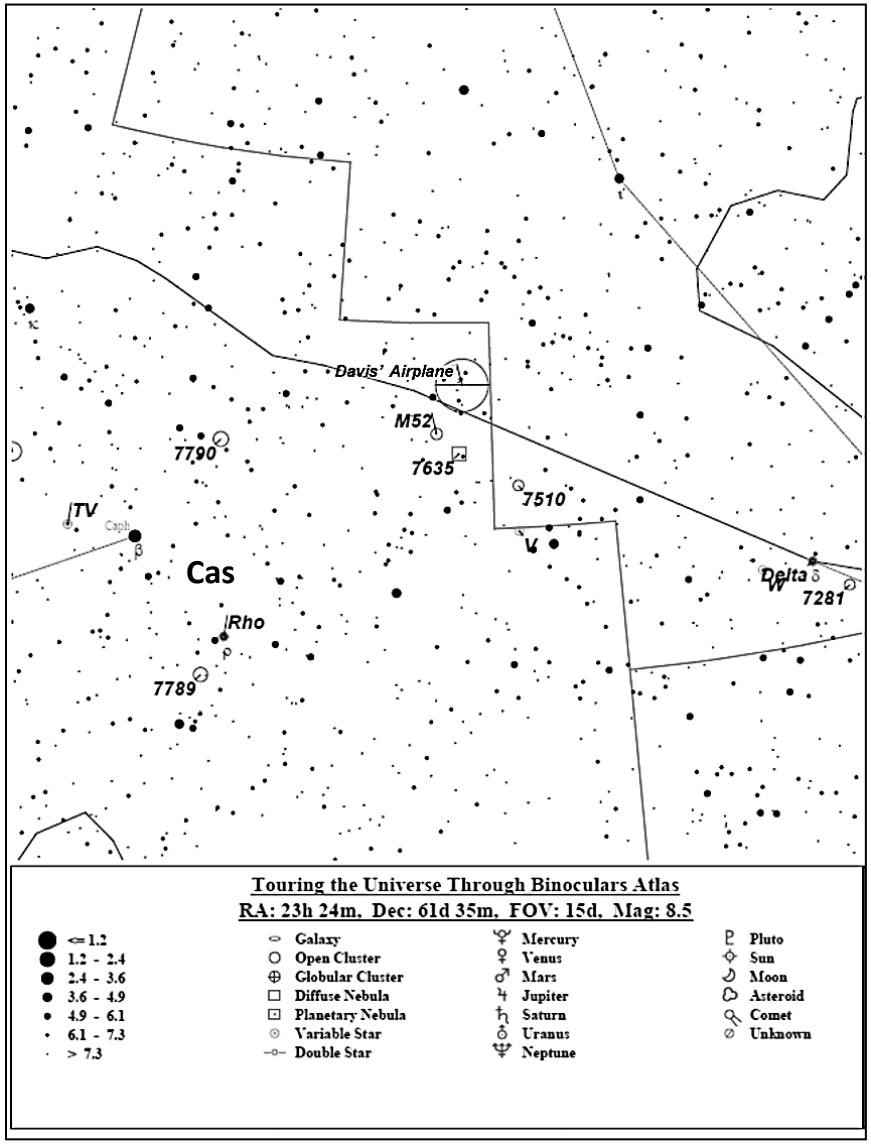



NGC 7293, the Helix Nebula, is the brightest and largest planetary nebula in the sky. It is also the closest, at about 695 light years away. But it can be very difficult to detect because it is so large. That's because its surface brightness is very low.

To find the Helix, first find Fomalhaut (Alpha [α] Piscis Austrini), which will be low in the southeastern sky. When you place Fomalhaut along the southeastern edge of your binocular field, 4th-magnitude Epsilon (ε) Piscis Austrini should pop into view along the opposite side. Move 6°, or about another field of view, due north to find 5th-magnitude Upsilon (υ) Aquarii. Finally, slide Upsilon just slightly to the east; the dim glow of the Helix should be nearly centered in view.

Through my own 10x50s, the Helix looks slightly oval, its long axis tilted northwest-southeast. The outer edge is slightly irregular in texture, with brighter sections toward the northeast and southwest, coincident with the disk's minor axis. I can't say with any certainty that I can detect the nebula's central hole through my 10x50s, even though it is so obvious in photographs. My 11x80s and 16x70s turn the Helix into the familiar ring shape, but only with averted vision.

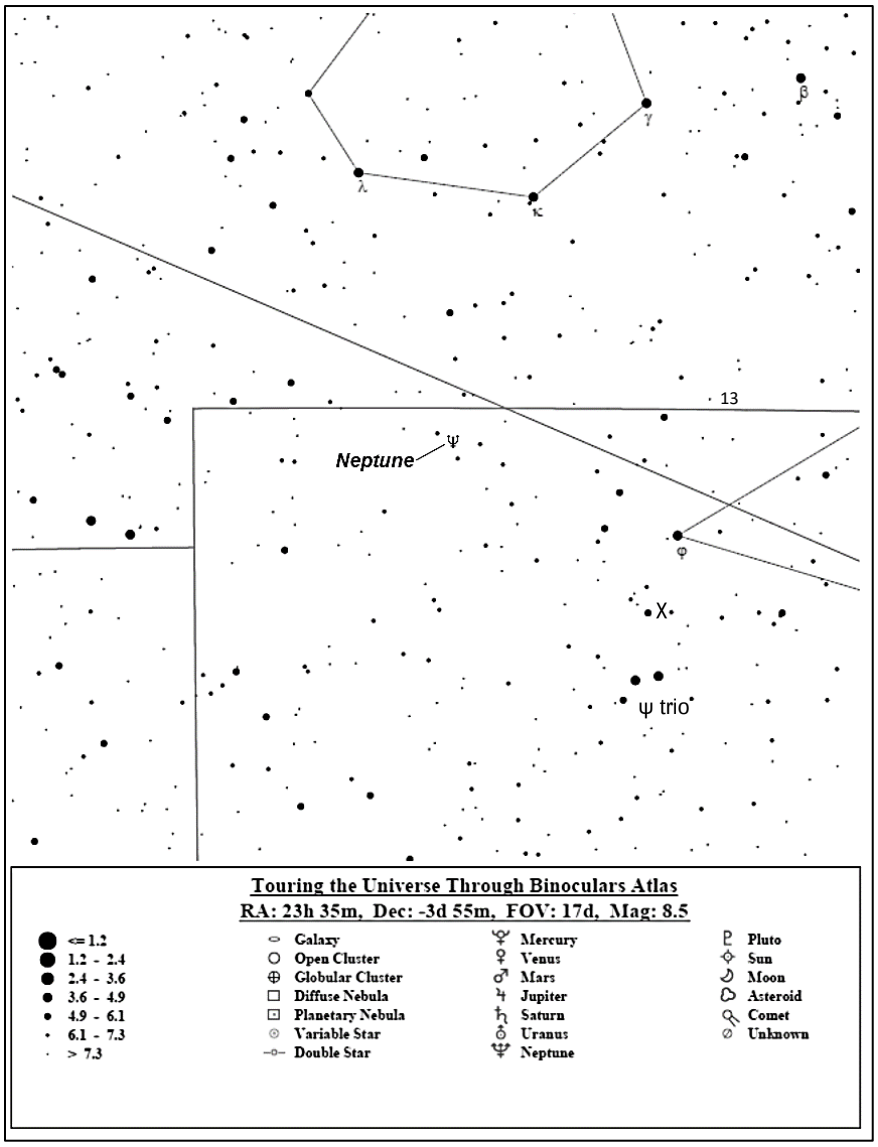
## 10. M52 (Cassiopeia Salt-and-Pepper Cluster) and Davis' Airplane




Let's turn our attention toward the western portion of Cassiopeia. By connecting a line from Schedar [Alpha (α) Cassiopeiae] to Caph [Beta (β) Cas], and then extending it an equal distance beyond, you'll arrive at the open cluster M52, Cassiopeia's Salt-and-Pepper Cluster. Discovered on September 7, 1774 by Charles Messier himself, M52 is an easy catch through just about any binocular. An estimated 200 stars call the cluster home, although only a few are bright enough to be seen in binoculars. The rest blend into a fog of stardust.

Just beyond M52, you may notice a slender diamond of four 5th- and 6th-magnitude stars, along with an arc of four fainter stars curving farther northwest. To the imaginative mind of the late Massachusetts amateur astronomer John Davis, those stars collectively formed an airplane. As he once explained it to me, "the plane's brightest star (red giant 4 Cassiopeiae) marks a light at the end of the eastern wing, while a lone 6th-magnitude star lies at the tip of the western wing. A short arc of faint stars stretching northward forms the plane's crooked tail." The diamond-shaped wingspan of Davis' Airplane extends 1° tip to tip, as does the curved fuselage from nose to tail.

## 11. Neptune

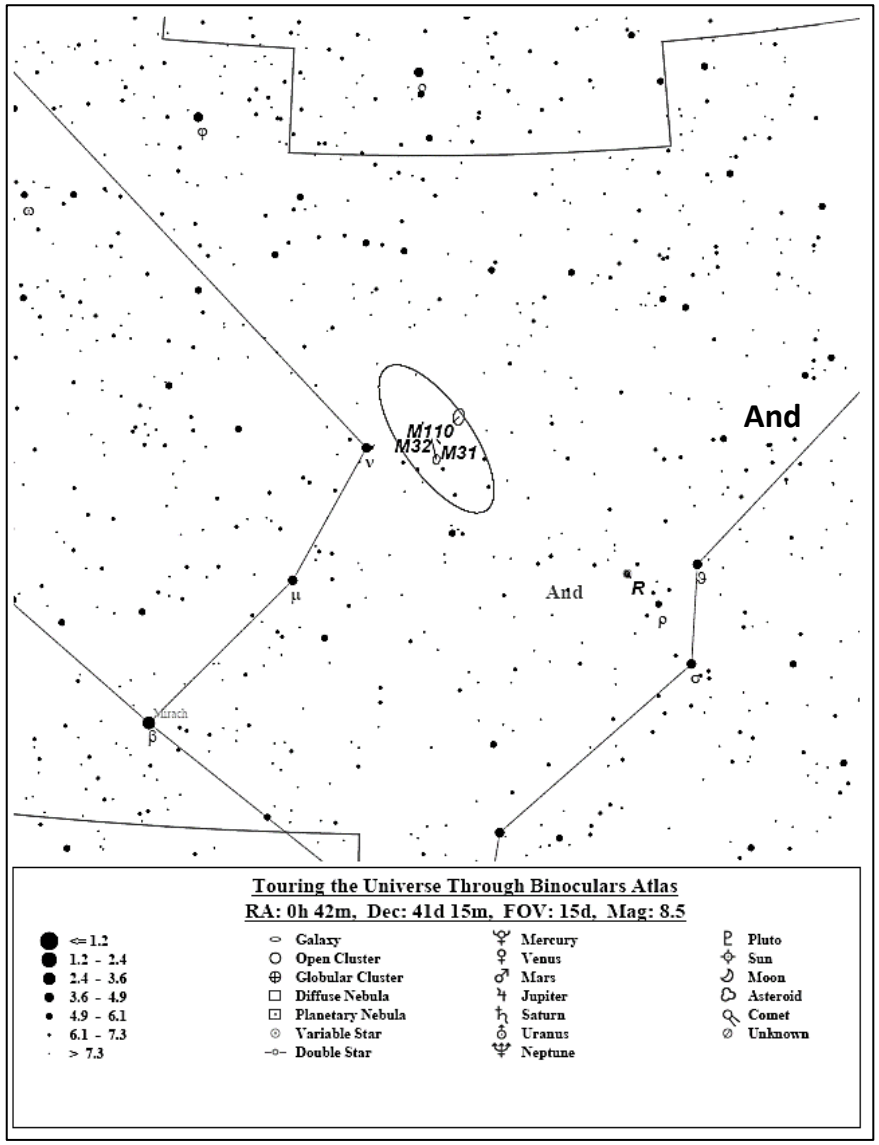



Neptune is currently located in a barren portion of eastern Aquarius. To find it, first locate by eye alone the Great Square of Pegasus and the bright star Fomalhaut (Alpha [α] Piscis Austrini). Once you spot both, aim your binoculars about halfway between the two. Scan slowly until you come to a distinctive obtuse triangle formed by the 4th- and 5th-magnitude trio of Psi-1 (ψ-1), Psi-2 (ψ-2), and Psi-3 (ψ-3) Aquarii. They create a pretty little asterism through binoculars.

Without moving the aim of your binoculars, look for 5th-magnitude Chi (χ) Aquarii, a pale red star about 1.5° northwest of the Psi trio. Another, slightly brighter red star is found 1.5° further northwest still. That's 4th-magnitude Phi (ϕ) Aquarii. Both of these red giants create a nice color contrast with bluish Neptune.

Neptune will rise at 9:43 PM EDT on August 6 and will be 3° east-northeast of Phi. In fact, you can probably squeeze the planet as well as Chi, Phi, and the Psi trio all into the same field. Of course, there are also several faint stars in the field that could be confused for Neptune. Which one is the planet? The giveaway is the color. Except for reddish Chi and Phi, all the stars in view will appear white. When you finally do identify bluish Neptune, you have found the most distant solar system member that is visible through binoculars.

## 12. M31, M32, M110 (Andromeda Galaxy and friends)



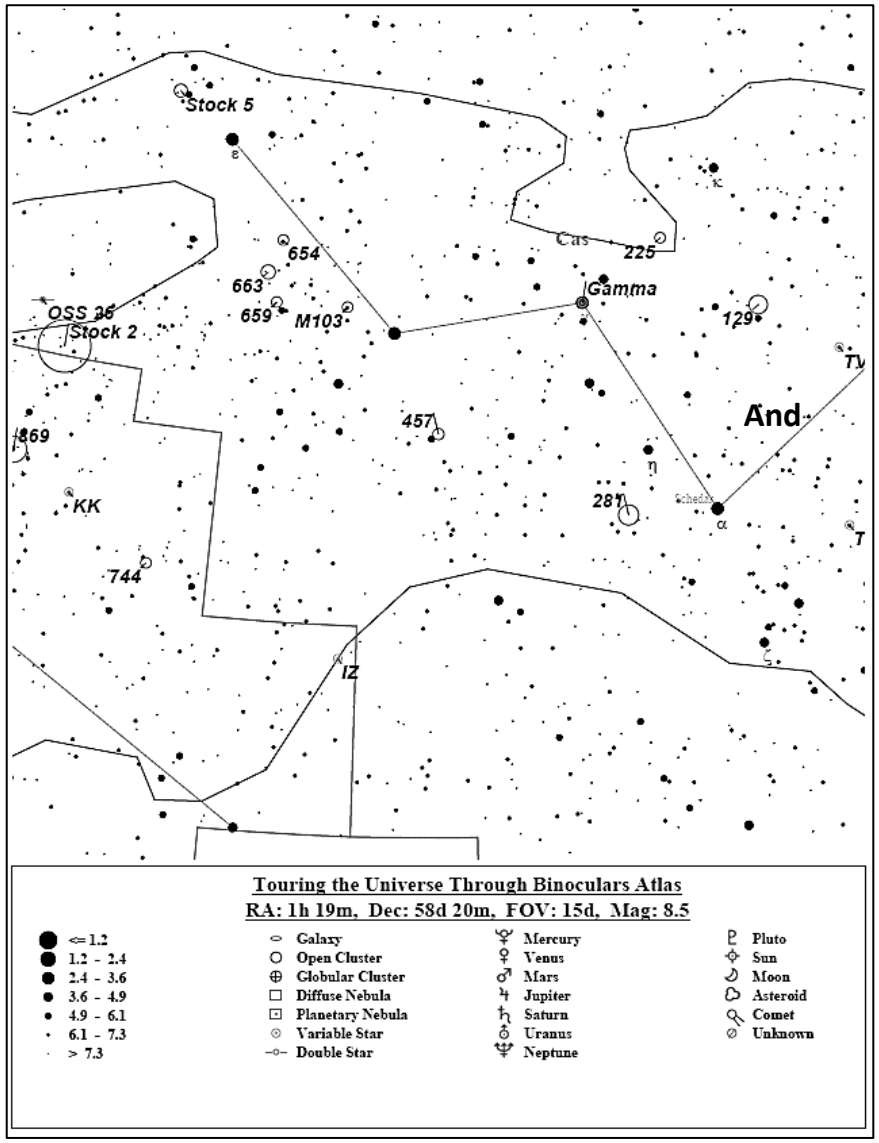

To find M31, first trace out the distended V-shape of the constellation Andromeda. Travel along the eastern side of the V, pausing at golden Mirach (Beta [β] Andromedae). From here, take a hard turn to the northwest, toward the faint naked-eye star Mu (μ) Andromedae about half a field of view away. Another half a field farther northwest lies Nu (ν) Andromedae, which is fainter still. Once at Nu, you're home because M31 lies just 1.5° to its west.

Through my 10x50s under dark Stellafane skies, Andromeda's spiral arm disk extends for an amazing 3°; that's six Full Moons stacked side by side. The trick to seeing the full span is to sweep *slowly* across its major axis from northeast to southwest. That's because our eyes are better at detecting faint, diffuse objects that are in motion rather than lying static.

M31 also has two companion galaxies nearby, M32 and M110. Both of these dwarf elliptical systems remind me of sentries guarding royalty. The smaller and brighter of the pair, M32 lies less than half a degree south of the heart of their ruler. At 10x, it looks like a slightly bloated 8th-magnitude star.

The second companion in view, M110, is also listed as 8th magnitude, but appears far fainter. That's because its light is spread over an area more than twice as large as its compact cohort. While M32 is reasonably obvious in my 10x50s from my suburban backyard, M110 is not. On clearer than usual nights I can spot it using averted vision, but otherwise it is reserved for darker skies or larger binoculars. M110 is a regular sight in my tripod-secured 16x70 binoculars even with less-than-ideal conditions.

## 13. NGC 457 (Owl Cluster)



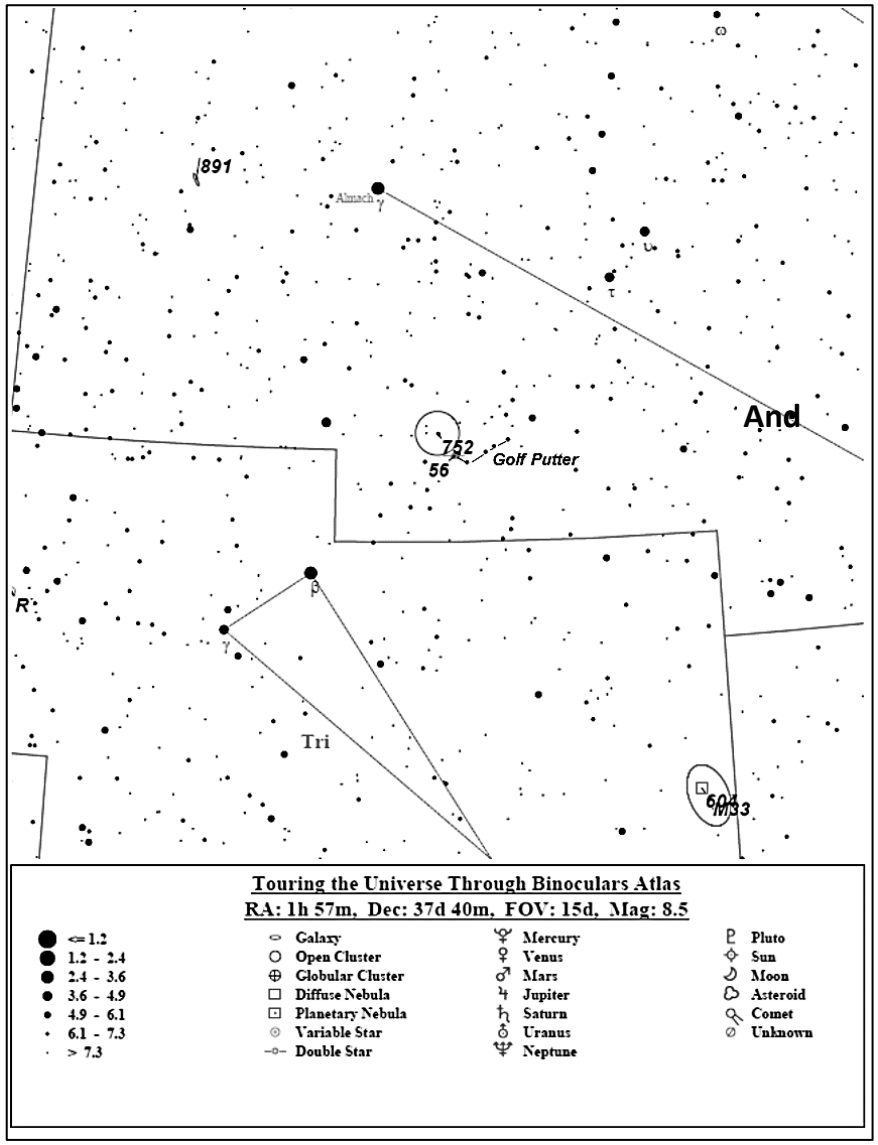

Open cluster NGC 457 is set about 2° southwest of Delta (δ) Cassiopeiae. More than 80 stars call this cluster home, with many visible through steadily braced 10x binoculars if you look carefully. Viewing through 70mm and larger apertures will reveal that the stars in NGC 457 create a very distinctive pattern. Some observers imagine a dragonfly; others a Hopi Kachina Doll; or even Hollywood's E.T., the Extraterrestrial. I prefer its nickname, the "Owl Cluster."

The owl's body is drawn from about a dozen stars that shine between magnitudes 9 and 11, with two 10th-magnitude suns marking the tail feathers. Two arcs, each containing about half a dozen suns, form the wings. The east wing is highlighted by a distinctive 8th-magnitude orange star. The owl's dazzling "eyes," marked by 5th-magnitude Phi-1 (ϕ-1) and 7th-magnitude Phi-2 (ϕ-2, aka HD 7902), are real attention getters.

NGC 457 is estimated to be about 7,900 light years away, but it is unclear whether the Phi pair are actual cluster members. Studies indicate they are physically close to the cluster in space. But the Phi's are so radically different than the other cluster stars, their true relationship is suspect.

Of Cassiopeia, author Garrett Serviss wrote in his 1888 book Astronomy with an Opera Glass, "Here the Milky Way is so rich that the observer hardly needs any guidance." Those words still ring true over 130 years later. By slowly sweeping the Cassiopeia W and the background Milky Way with your binoculars, you'll find buried treasures in almost every field.

## 14. NGC 752 (Golf Ball Cluster) and the Golf Putter



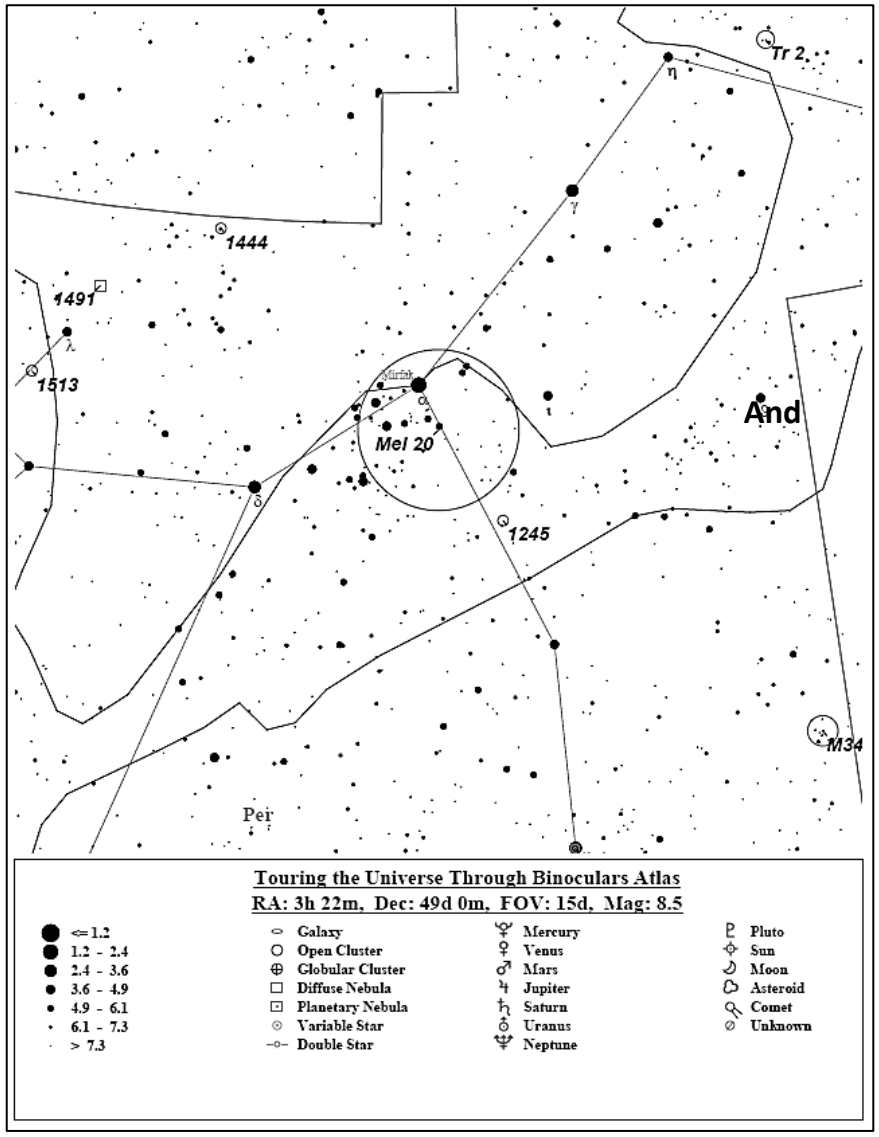

Locate the tiny constellation Triangulum, east of Andromeda. Draw an imaginary line from Gamma (γ) to Beta (β) Trianguli and extend it to the northwest across the border into Andromeda. About a binocular field beyond Beta, you'll spot a colorful double star. The brighter of the pair is 56 Andromedae, a yellow giant star. Its neighbor, cataloged as SAO 55102, is just 3.5 arc-minutes to the northwest. Despite appearances, however, they are actually nowhere near each other in space. While 56 is 316 light years from us, SAO 55102 is another 605 light years further still.

You'll also notice a third 6th-magnitude star, SAO 55082, 14 arc-minutes to the pair's southwest. All three create a slender triangle of 6th-magnitude stars that easily fits into the same binocular field.

When he gazed toward that triangle through his binoculars, the late deep-sky devotee and Stellafane fixture John Davis from Amherst, Massachusetts, imagined a golf putter here. He saw the triangle as the putter's blade. Its handle is formed from five additional stars extending for 1.5° to the northwest from the triangle's tip. The handle ends at 6th-magnitude SAO 66630, another orange star.

Now, look for a soft glow less than a degree northeast of 56 Andromedae. See it? It will look like a round, grayish smudge of light about as large as the Full Moon. That's open cluster NGC 752. With an overall magnitude of 5.7, it is faintly visible to the eye alone given clear, dark skies. The cluster is home to about 60 stars, none of which are brighter than 9th magnitude. A few faint specks just might peak out with 50mm binoculars, while about a dozen show themselves through 70mm and larger apertures. The remaining stars seem just beyond the limit of visibility, blending together to make the cluster appear "grainy."

## 15. Melotte 20 (Alpha Persei Association)




Begin by aiming toward Mirfak (Alpha [α] Persei) through your binoculars. Notice how it is surrounded by dozens of fainter stars scattered in small clumps and patterns. Together, the stars gathered into this football-shaped area form the Alpha Persei Association, one of the sky's true binocular gems.

A stellar association contains mostly young blue-white (spectral type O) and white (spectral type B) stars, like many open star clusters. Typically, however, the stars in an association are more loosely gathered than those in most open clusters. In the case of the Alpha Persei group, some 50 stars are bound by their mutual, though weak gravitational field. Eventually, they will scatter as their gravitational bonds continue to weaken.

While most of the Association's stars sparkle like white or blue-white diamonds and sapphires, a few might show slight tinges of yellow or orange.

One to be on the lookout for is the orange star Sigma (σ) Persei, one of three suns forming a small triangle south of Mirfak. Also, take a look for two whitish double stars to the north of Mirfak.