Observe the summer sky

Find your way through the **summer sky**

**10 top** summer binocular treats

Explore the **Summer Triangle**
If you want to begin observing the sky, start in the summer. Lots of bright stars populate the sky then, guiding you to the constellations that contain them. The brightest part of the Milky Way arches from north to south. In that star-packed region, deep-sky treasures visible through binoculars abound. Plus, it’s warm outside, helping you to observe longer.

High in the northwest in the evening, seven stars form the Big Dipper. This well-known group daily circles the North Star, Polaris (Alpha [α] Ursae Minoris). The two stars at the end of the Dipper’s bowl — the Pointer Stars — point to Polaris. The Big Dipper, however, is not a constellation. It’s part of Ursa Major the Great Bear.

Notice the description of Polaris in parentheses. You’ll see a Greek letter, its symbol, and the possessive form of the constellation name. Only a few hundred stars have proper names, but about a thousand have Greek letters associated with them. This practice began with German mapmaker Johann Bayer (1572–1625) in his star atlas Uranometria, published in 1603. Astronomers have used his stellar designations ever since.

Use the curve of the Big Dipper’s handle to lead you south to Arcturus (Alpha Bootis), the brightest star in the constellation Boötes the Herdsman. Arcturus glows orange, indicating it’s a cool star. It ranks as the fourth-brightest nighttime star, and the brightest in the northern half of the sky.

Overhead, three bright stars form summer’s second-easiest star picture (next to the Big Dipper) — the Summer Triangle. Each is the Alpha star in its constellation. The brightest is Vega, in Lyra the Harp; next brightest is Altair, in Aquila the Eagle; the third is Deneb, the star marking the tail of Cygnus the Swan.

Cygnus contains the asterism of the Northern Cross. Albireo (Beta [β] Cygni) lies at the base of the cross. This object is one of the top 10 showpieces for small telescopes. Albireo is a colorful double star, wide enough that even 10x50 binoculars will separate the pair. Color perception is
unique among humans, but most observers see these stars as gold and sapphire-blue.

Just outside Cygnus’ Milky Way region lies Lyra. In the same binocular field as Vega is Epsilon (ε) Lyrae, a wide double star with two equally bright components. Amateur astronomers know Epsilon Lyrae as the Double Double because each member is itself a double star. You can split each pair by using high magnification through a 2.4-inch (60-millimeter) scope.

Try finding the Coathanger asterism through your binoculars. About halfway between Albeiro and Altair, the Coathanger is a line of six stars with a curve of four stars (the hook) protruding from its center.

A bit west of the Summer Triangle lies Hercules, the legendary hero. This constellation contains one of amateur astronomy’s main tourist sights — the Hercules Cluster (M13), the finest globular star cluster in the northern sky. M13 lies along one side of the Keystone, a crooked box of four medium-bright stars that mark the Hero’s body.

You’ll find the Keystone about two-thirds of the way from Arcturus to Vega. You can glimpse M13 with your unaided eyes under a dark sky, but it looks better through binoculars, where it will appear half the width of the Full Moon.

The “M” before the number 13 stands for “Messier object.” French comet-hunter Charles Messier (1730–1817) compiled a list of 109 such objects. Through the small telescopes of his day, such objects resembled comets. He wanted other observers to realize they weren’t comets. Through today’s scopes, however, Messier’s list contains many of the finest celestial targets.

Hercules stands head to head with another giant in the sky, Ophiuchus the Serpent-bearer. Ophiuchus is a man entwined by a large snake — Serpens — the only constellation divided into two separate parts. In his left hand, Ophiuchus holds the snake’s head, Serpens Caput. To Ophiuchus’ east is Serpens Cauda.

Ophiuchus, in turn, stands on the body of Scorpius the Scorpion. Because Scorpius and neighboring Sagittarius lie in the southern part of the sky, thick air layers dim their glory from northern latitudes. Everyone should be able to find Antares (Alpha Scorpii), the bright star marking the Scorpion’s heart. Antares is a red supergiant 400 times larger than the Sun.

Next to the Scorpion’s stinger lie two glorious open star clusters, M6 and M7. M6, popularly known as the Butterfly Cluster because of its shape, appears slightly elliptical, and its brightest star is an orange giant that varies in brightness.

M7 is easy to spot with your naked eyes as a bright knot in the southern Milky Way. Through binoculars, M7 appears more than twice as wide as the Full Moon. M7’s central stars are arranged in an X, while the outliers form a triangle.

East of Scorpius lies Sagittarius, toward the center of our galaxy. Sagittarius has many wonderful deep-sky objects within its borders. Start with the Lagoon Nebula (M8), a milky glow 3 Moon-diameters long with a dark rift down its center. Near M8 sits M22, a fine globular cluster. Under a dark sky, binoculars show it as a woolly ball about two-thirds the Moon’s diameter.

Finally, move north along the Milky Way into Scutum to encounter the Wild Duck Cluster (M11), one of the summer sky’s best clusters. English observer William Henry Smyth (1788–1865) called M11 the Wild Duck Cluster because it’s V-shaped, like a flight of wildfowl. Small telescopes show the V has a brighter star at its apex.

Once you learn the main constellations and bright stars in the summer sky, it’s an easy transition to the other three seasons. In a short time, you’ll be locating lots of great objects to share with others. And you won’t even need a star map.
Binocular stargazing

10 top summer binocular treats

You won’t need a large telescope to spot these celestial wonders.

by Phil Harrington

Summer time, stargazing, and binoculars. In my mind, the three are inseparable. Is there anything better than sitting back with binoculars and scanning the summer Milky Way as it flows overhead? To start you off on your journey across the summer binocular universe, I’ve compiled a top 10 list of my favorite seasonal targets.

The Hero’s cluster

In May, we begin high in the eastern sky with the Hercules Cluster (M13). Aim a third of the way from brilliant Vega (Alpha [α] Lyrae) to Arcturus (Alpha Boötis), and you’ll see a faint smudge of light along the western side of Hercules’ dim Keystone asterism. Hard to believe, but what looks like a tiny ball of celestial cotton is actually a massive collection of more than 100,000 stars, which astronomers classify as a globular star cluster (because of its globe shape). M13 lies 25,000 light-years away.

Star clouds in Scorpius

The Butterfly Cluster (M6) and Ptolemy’s Cluster (M7) are two open star clusters in Scorpius. They sit near the stinger stars Shaula and Lesath (Lambda [λ] and Upsilon [υ] Scorpii) at the end of the Scorpion’s curved body. Place those stars at the bottom edge of your binoculars’ field of view, and you will see two distinct bundles of stars to their upper left.

M6, the smaller and more northerly of the pair, looks roughly rectangular. Some observers imagine that its stars form a butterfly’s outline, with two wings outstretched. The butterfly appears to be flying toward the southeast.

M7, mentioned by Greek philosopher Ptolemy around A.D. 130 and thus called Ptolemy’s Cluster, is larger and brighter than M6. Even through the smallest binoculars, several of the cluster’s stars show subtle hints of yellow and blue. The brightest is a golden sun lying near the group’s center.

The Archer’s lagoon

Shifting eastward, we arrive at the constellation Sagittarius the Archer, with its distinctive Teapot asterism. By scanning the Milky Way streaming northward from the Teapot’s spout, you’ll pass several bright clumps of starlight. The largest, which lies about a binocular field of view north of the spout, is a huge emission nebula called the Lagoon Nebula (M8).

The nebula appears lopsided, with the western side more bloated than the eastern half. If you have dark skies and a steady hand, you might spot the dark lagoon that divides the nebula in half. The magnitude 5.9 star 9 Sagittarii sits west of the lane.

A celestial swan

Farther north along the Milky Way in Sagittarius we come to the Swan Nebula (M17), another emission nebula. Look for it about 1½ fields of view north of the Teapot’s lid and just south of a yellowish 5th-magnitude star. With a magnification of 10x or more, look for a straight bar of light along the cloud’s northern edge. Can you also see a faint hook of nebulosity curving off the bar’s western end? It’s this hook-and-bar shape that gave rise to the Swan Nebula nickname.

A southern cotton ball

While many observers cite this list’s first object — M13 — as their favorite summer globular cluster, I prefer M22 in Sagittarius because of its aesthetics. M13 is isolated in Hercules, but M22 is right in the thick of the Milky Way. Look for its circular glow about half a binocular field northeast of Kaus Borealis (Lambda Sagittarii) at the Teapot’s top. Binoculars easily show a fuzzy halo surrounding a brighter core.

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Like birds in flight
The Wild Duck Cluster (M11) sits in Scutum, but the easiest way to find it is to look 4° west-southwest of the magnitude 3.4 star Lambda Aquilae, one of the tail stars of Aquila the Eagle. M11 is one of the sky’s densest open clusters. More than 600 of M11’s stars shine brighter than 15th magnitude, but only a single 8th-magnitude rebel is bright enough to show through binoculars. The rest blend into a small, bright mist of starlight that looks more like a globular than an open cluster.

Hang around these stars
The Coathanger (Collinder 399), which lies in Vulpecula the Fox, is one of my all-time favorite binocular objects. It’s easy to find if you look about two fields northwest of Altair, Aquila’s brightest star. Even a casual scan will immediately reveal the asterism’s unique shape. Ten stars glow brighter than 7th magnitude. Six in a straight line form its crossbar, and another four to the south curve to create the hook. Powers of 7x to 10x give the best view of the Coathanger dangling in a star-filled closet.

A continent in the sky
Our last object needs a dark sky, but once you spot it, it’s sure to become a favorite. Simply aim your binoculars toward Deneb in Cygnus, and look roughly half a field of view (3°) to its east. Can you see a slightly brighter, hook-shaped patch of Milky Way? That’s the North America Nebula (NGC 7000). The easiest part to see is the East Coast as it stretches from Long Island to Florida and then around to the Gulf of Mexico.

Enjoy each of these targets and then branch out on your own to discover more of what this season has to offer. Summer is made for binocular stargazing. And remember that, as always, two eyes are better than one.

Explore more images of these summer binocular objects online at www.Astronomy.com/toc.
Deep-sky observing

Explore the Summer Triangle

Although you’ll never see Mars within the area bounded by these three bright stars, you can explore double stars, nebulae, and star clusters. by Michael E. Bakich

From June through October in the Northern Hemisphere, the three stars of the Summer Triangle ride highest. Top dog is Vega (Alpha [α] Lyrae), the fifth-brightest star in the night sky. At magnitude 0.03, it has long been astronomy’s standard zero-magnitude star. Altair (Alpha Aquilae), the 12th-brightest star, glows with half Vega’s output at magnitude 0.77. Last, but only least when compared to its two companions, magnitude 1.25 Deneb (Alpha Cygni) comes in as the 19th-brightest star, one-third as bright as Vega.

The region bounded by the Summer Triangle contains enough deep-sky treats to keep you observing for many hours. Let’s examine a few of them.

Start in the Harp

Begin by pointing your telescope midway between Sheliak (Beta [β] Lyrae) and Sulaphat (Gamma [γ] Lyrae) to find the Ring Nebula (M57). Through a 4-inch telescope, you’ll see the Ring as a pale gray ball 71” across with a magnitude of 8.8. If you use a magnification above 100x, you’ll notice that the ball’s outer part looks thicker than the central region. This gives M57 its distinctive “ring” appearance.

Even for large-scope users, spotting M57’s central star ranks as a difficult observing challenge. With a 16-inch or larger instrument on a night of excellent seeing, use an eyepiece that yields between 300x and 400x. Keep in mind that you’re searching for a 15th-magnitude star against a background that’s not completely dark.

If the central star doesn’t show itself immediately, lightly tap on the tube. Because the eye is sensitive to motion, you may spot the central star at this point.

You’ll find the next object a bit more than 5.5° east-southeast of M57. It’s globular cluster M56, which, at magnitude 8.4, shows up in binoculars from a dark site.

Through a telescope, the density of stars in M56 increases dramatically as you move toward its core. And because the individual cluster stars aren’t all that bright, you’ll resolve them best through 8-inch or larger telescopes and at magnifications exceeding 150x. When you’re done examining the inner workings of M56, back off the power and enjoy the star field this cluster is in.

Now target Delta (δ) Lyrae to observe the open cluster Stephenson 1, also known as the Delta Lyrae Cluster. This is a pretty sight through even a 3-inch scope. Powers around 50x will split the standout suns in this cluster, Delta1 and Delta2 Lyrae, easily. The former is a blue magnitude 5.6 star while its companion (some 10’ away) is an orange luminary shining at magnitude 4.5. The rest of the cluster counts 50 stars of various brightnesses.

Our last object in Lyra is the gorgeous open cluster NGC 6791, which lies less than 1° east-southeast of magnitude 4.4 Theta (θ) Lyrae. Its diameter of 15’ — nearly half that of the Full Moon — means that, even at magnitude 9.5, NGC 6791 appears faint through small scopes. In fact, you may be fooled into thinking it’s a globular cluster.

Through 12-inch and larger instruments, NGC 6791 begins to strut its stuff. Dozens of faint cluster stars begin to resolve into a fine, evenly distributed pile of diamond dust.

Explore Cygnus

In the center of the Summer Triangle, you’ll find Albireo (Beta Cygni), one of the sky’s finest double stars through any size telescope. The primary star shines golden at magnitude 3.4 while its companion glows sapphire-blue at magnitude 5.2. A healthy 35° separate the two.

Our next object, the Crescent Nebula (NGC 6888), is a bubble of gas carved out of the interstellar medium by an energetic sun called a Wolf-Rayet star, after the two astronomers who identified the type. It shines at 7th magnitude at NGC 6888’s center. The Crescent lies 1.2° west-northwest of the magnitude 4.8 star 34 Cygni.

Although you’ll spot the Crescent Nebula through small scopes, 8-inch and larger instruments begin to show some of its structure. The slightly curved northwestern edge is the brightest, but a short line of bright nebulosity also lies to the southwest.

From the Crescent, move a bit more than 2° east to M29. Although this target is a Messier object, it’s one of the most difficult to identify. The reason is that M29 is a loose open cluster of about two dozen stars lying in front of a rich Milky Way star field.

To find it, look 1.8° south of magnitude 2.2 Sadr (Gamma Cygni). A small telescope
works best on this cluster because it won’t reveal the multitude of surrounding stars. To prove this to myself, I once made a cardboard insert for the front of a 12-inch telescope. The insert had a 3-inch-diameter hole in it, which I had carefully cut out. I viewed M29 with and without the insert, and the cluster was, indeed, easier to pick out when the insert was in place.

Poor Aquila

Because the Summer Triangle’s stars come from three constellations, you should assume that Aquila brings something to the table. Alas, such a small area of the Eagle lies within the triangle that we can attribute no deep-sky treats to this constellation. Still, I didn’t have the heart to totally exclude Aquila, so, ever-so-slightly outside the bounds of the triangle, look for one of my all-time favorite binocular objects. Barnard’s E, a combo of two dark nebulae from American astronomer Edward Emerson Barnard’s famous catalog, lies against the rich Milky Way. Start at yellow magnitude 2.7 Tarazed (Gamma Aquilae). If you center that star, you shouldn’t have to move your binoculars at all. Barnard’s E lies 1.4° to the west-northwest.

Barnard 143 (often designated B143) is the easiest of the pair to spot. It’s a narrow bar about 15’ long, oriented east-west. Two slightly less distinct dark bars connect to it and form a U shape. Just to the south lies Barnard 142 (B142), another dark nebula not quite as long and only one-third as wide, making it more difficult to see. Behind these dark clouds, you’ll see the light of thousands of unresolved stars.

Bonus entries

The three constellations already discussed don’t completely cover the area of the Summer Triangle. In fact, you’ll find half of Vulpecula the Fox and almost all of Sagitta the Arrow in our chosen area.

Our next object is an easy one to spot through binoculars. Extend a line southward from Albireo in Cygnus through magnitude 4.4 Alpha Vulpeculae. That distance is roughly 3°. Head 4.5° farther south, and you’ll encounter Collinder 399.

This group was the 399th entry (out of 471) in a catalog of open clusters compiled by Swedish astronomer Per Arne Collinder. Its most common name, the Coathanger, comes from its shape.

Because it’s so big, the Coathanger looks best at magnifications of 20x or less. Ten stars glow brighter than 7th magnitude, so the group appears as a distinct glow to the naked eye on dark nights. The brightest are 4 Vulpeculae, at magnitude 5.1; 5 Vulpeculae, at magnitude 5.6; and 7 Vulpeculae, which shines at magnitude 6.3.

For my final object, I’d be hard-pressed to leave out the Dumbbell Nebula (M27), a great object for small-scope owners. You can find it by drawing a line from Altair to Sadr. M27 lies slightly less than halfway from your starting point.

M27 owes its common name to a double-lobe shape common among planetary nebulae. Even through binoculars, this object is easy to spot. To see details in it, however, set up your telescope.

A 4-inch scope shows the two bright lobes and several stars scattered across M27’s face. This object responds well to high magnifications because it has a high surface brightness. Use a large telescope with an Oxygen-III filter and really crank up the magnification.

After a night or two hunting objects within the Summer Triangle, you’ll see those three stars in a whole new light.