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# SKY & TELESCOPE

THE ESSENTIAL GUIDE TO ASTRONOMY

AUGUST 2024

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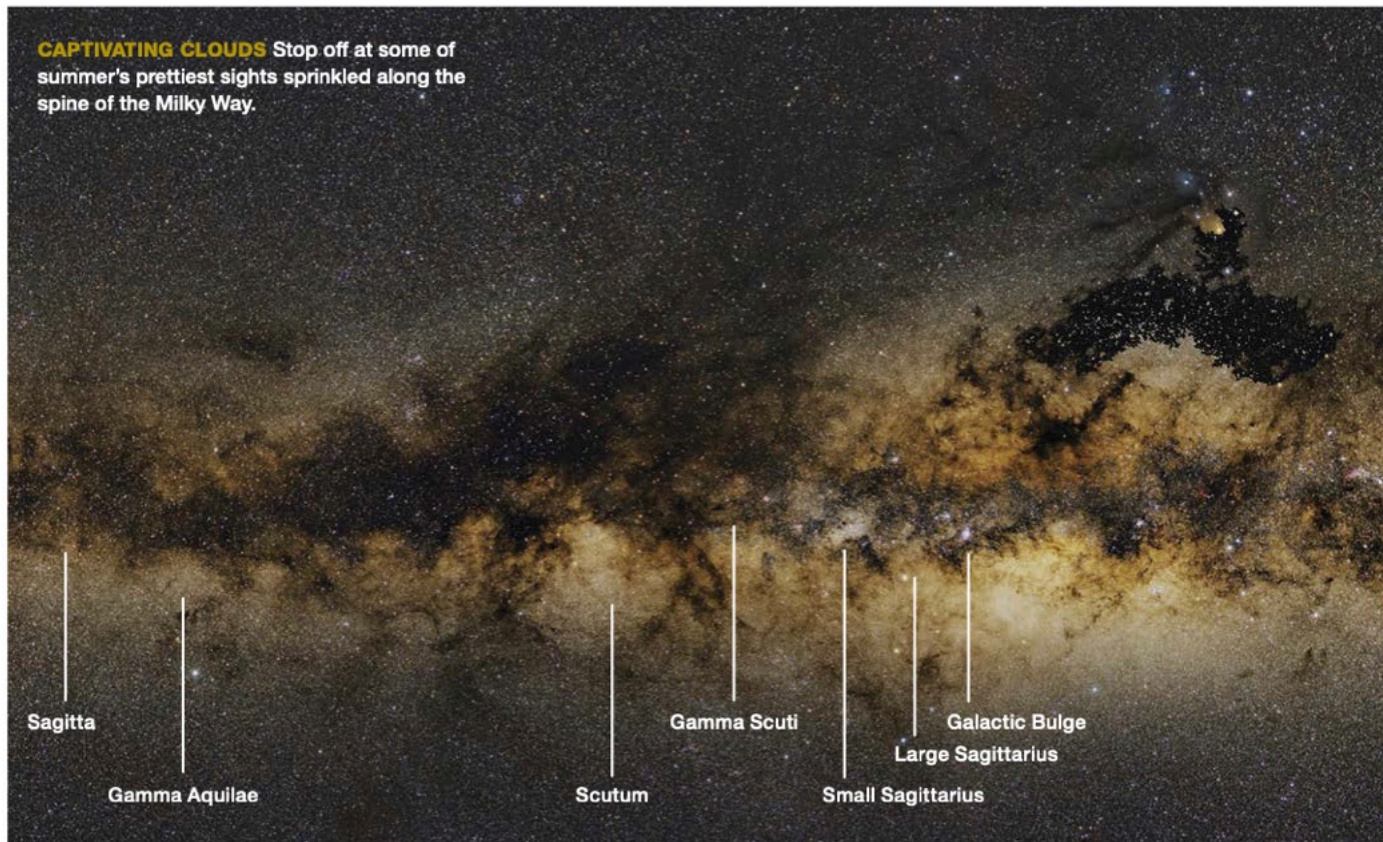
# Summer Star Clouds

Spend some time navigating among shimmering sights.

**D**uring summertime, when it's too cloudy for astronomy, I often quench my thirst for starlight with a remarkable series of century-old photographs by Edward Emerson Barnard, the patron saint of Milky Way observers and imagers. In his *A Photographic Atlas of Selected Regions of the Milky Way*, published in 1927 (and updated by Gerald Orin Dobek in 2011), Barnard's images show the staggering beauty and complexity of a major spiral galaxy seen close up (*S&T*: Aug. 2023, p. 28). They also inspire new ideas for observing projects throughout the year.

Barnard's pioneering astrophotography helped elucidate the structure and contents of the Milky Way in the early 20th century, especially the nature of the dark nebulae he captured in his images. Many of these nebulae were eventually compiled into a catalog of 349 "Barnard" objects. But Barnard also revered the brilliant starry patches in the Milky Way that he first observed as an amateur comet hunter. In his book he wrote, "The stars pile up in great cumulous masses like summer clouds," especially where the "extreme brilliancy of these great star clouds" was most prominent

**CAPTIVATING CLOUDS** Stop off at some of summer's prettiest sights sprinkled along the spine of the Milky Way.



SPINE OF THE MILKY WAY: FRANK SACKENHEIM; SAGITTARIUS: BRIAN VENTRUDDO



**SHIMMERING SIGHTS**

Sagittarius offers splendid views of Milky Way fields comprising thousands of stars. The fun doesn't stop there — follow the Milky Way northward through neighboring constellations for more star clouds.



Galactic Bulge RA 17<sup>h</sup> 53<sup>m</sup> Dec. -34° 46'

Object	Type	Mag(v)	Size	RA	Dec.
M7	Open cluster	3.3	75'	17 <sup>h</sup> 53.8 <sup>m</sup>	-34° 48'
B287	Dark nebula	–	25' × 15'	17 <sup>h</sup> 54.4 <sup>m</sup>	-35° 12'
B286	Dark nebula	–	15'	17 <sup>h</sup> 53.1 <sup>m</sup>	-35° 37'
NGC 6437	Star field	–	40'	17 <sup>h</sup> 48.4 <sup>m</sup>	-35° 26'
NGC 6455	Star field	–	58'	17 <sup>h</sup> 51.1 <sup>m</sup>	-35° 20'

For all tables: Angular sizes are from recent catalogs; right ascension and declination are for equinox 2000.0.

▲ **STAR CLUSTER UPON A STAR CLOUD** The Scorpius open cluster M7 is a foreground object in the line of sight of a much more distant star cloud. Accompanying M7 are two clumpings of stars listed in the *New General Catalogue of Nebulae and Star Clusters* but that aren't technically clusters — instead, they're designated as star fields.

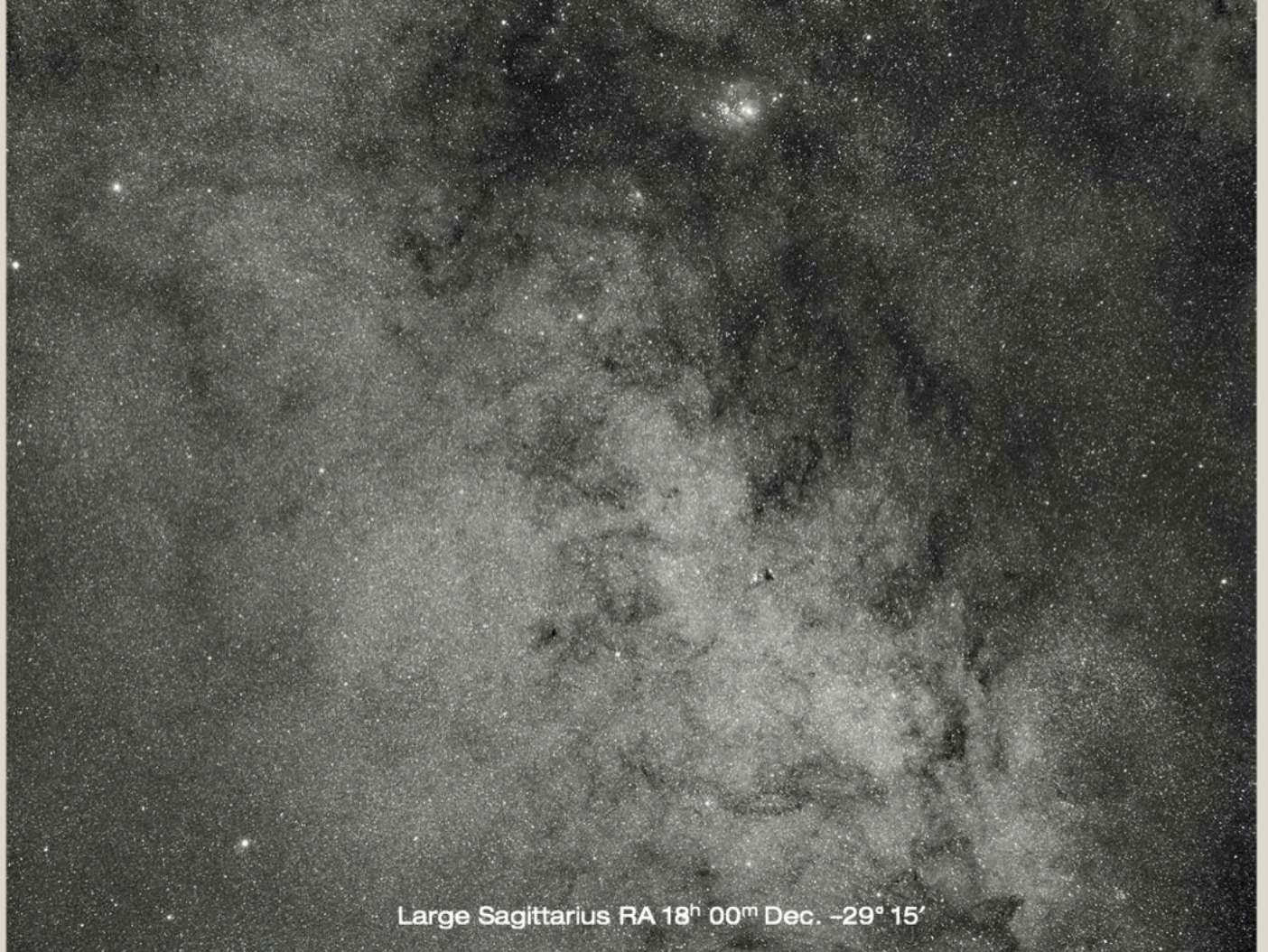
toward Sagittarius and Scutum. Barnard likely wasn't the first to use the term *star cloud*, but his images have long inspired stargazers to observe them.

What is a star cloud? Unlike open or globular star clusters, there's no strict scientific definition. We now understand that what Barnard called star clouds are simply distant and star-dense patches of our galaxy's bulge or spiral arms seen through gaps in the dark thunderheads of interstellar gas and dust. In summer, Northern Hemisphere observers get their best looks at the most prominent star clouds, and many serve as bases for exploring deep-sky sights nearby. For this tour, I deployed a pair of 2.1×42 "constellation binoculars" and image-stabilized 15×50 binoculars for wide views, an 85-mm

f/6 refractor, and a 10-inch Dobsonian f/4.7 to bring out detail on smaller objects. Let's begin with some bright summer star clouds low in the south then move northwards along the Milky Way's starry band.

### A Glimpse into the Center of the Milky Way

Some 5° northeast of the Stinger of Scorpius, the Scorpion, you'll find the lovely open cluster **M7**. If you're looking at the Messier, you're also looking at a small, dense star cloud. The 3.3-magnitude cluster, which spans about 75', is a foreground object around 1,000 light-years away, while the star cloud lies at least 10,000 light-years distant toward the center of the galaxy. The cloud is roughly rectangular, about 1.7° × 0.7°



Large Sagittarius RA 18<sup>h</sup> 00<sup>m</sup> Dec. -29° 15'

▲ **THE ARCHER'S DUO** West of the Teapot asterism is the larger of the two star clouds we'll visit on this tour in Sagittarius. This image and the one on page 24 were captured under the dark skies of Eastern Maine on photographic film using a Pentax 67 camera with a 400-mm f/4 prime lens piggy-backed on an 8-inch Meade 2080.

Object	Type	Mag(v)	Size	RA	Dec.
B295	Dark nebula	–	50'	18 <sup>h</sup> 04.1 <sup>m</sup>	-32° 00'
B289	Dark nebula	–	35' × 7'	17 <sup>h</sup> 56.6 <sup>m</sup>	-29° 01'
NGC 6520	Open cluster	7.6	5'	18 <sup>h</sup> 03.4 <sup>m</sup>	-27° 53'
B86	Dark nebula	–	5'	18 <sup>h</sup> 03.0 <sup>m</sup>	-27° 52'
NGC 6522	Globular cluster	9.9	9.4'	18 <sup>h</sup> 03.6 <sup>m</sup>	-30° 02'
Baade's Window	Star field	4	60'	18 <sup>h</sup> 03.6 <sup>m</sup>	-30° 02'
NGC 6528	Globular cluster	9.6	5'	18 <sup>h</sup> 04.8 <sup>m</sup>	-30° 03'
B298	Dark nebula	–	4'	18 <sup>h</sup> 05.2 <sup>m</sup>	-30° 06'

stretching in a northeast-to-southwest direction with M7 near its geometric center. The dark nebula **B287**, spanning 25' × 15', lies immediately southeast of the cluster, while the smaller oval of **B286**, some 15' across, sits around 50' south of M7 and features the 6th-magnitude foreground star HD 162517. When I aim right at M7 with my 85-mm refractor with a 13-mm Ethos eyepiece (46× and 2.2° field of view), I see a spectacular vista. The cloud behind M7 appears off-white — a striking contrast with the blue-white stars of the cluster. Images reveal a yellow tinge to these ancient stars near the Milky Way's core.

Two concentrations of stars lie within the larger star cloud. Look for 40'-wide **NGC 6437** about 1° southwest of M7. Between NGC 6437 and M7, you'll find **NGC 6455**, a Milky

Way field featuring several 7th- to 9th-magnitude stars. At first, I couldn't distinguish these clumpings of stars with my small refractor from the broader cloud. But I finally extracted them with my 10-inch Dob fitted with a 35-mm Panoptic yielding a 2° field. (A tip of the hat to Chris Beckett of the Royal Astronomical Society of Canada for pointing me to these little concentrations.)

Now slew to the **Large Sagittarius Star Cloud** northwest of the spout of the Teapot asterism. Here we're looking directly toward the center of our galaxy some 26,000 light-years away. The cloud's brightest section spans about 6° × 4° and extends northeast to southwest on its long axis. Along its northwestern edge it borders the dark Great Rift, which



Small Sagittarius RA 18<sup>h</sup> 19<sup>m</sup> Dec. -18° 33'

Object	Type	Mag(v)	Size	RA	Dec.
B92	Dark nebula	–	15' × 9'	18 <sup>h</sup> 15.6 <sup>m</sup>	-18° 14'
B93	Dark nebula	–	15' × 2'	18 <sup>h</sup> 16.9 <sup>m</sup>	-18° 04'
NGC 6603	Open cluster	11.1	4'	18 <sup>h</sup> 18.4 <sup>m</sup>	-18° 24'

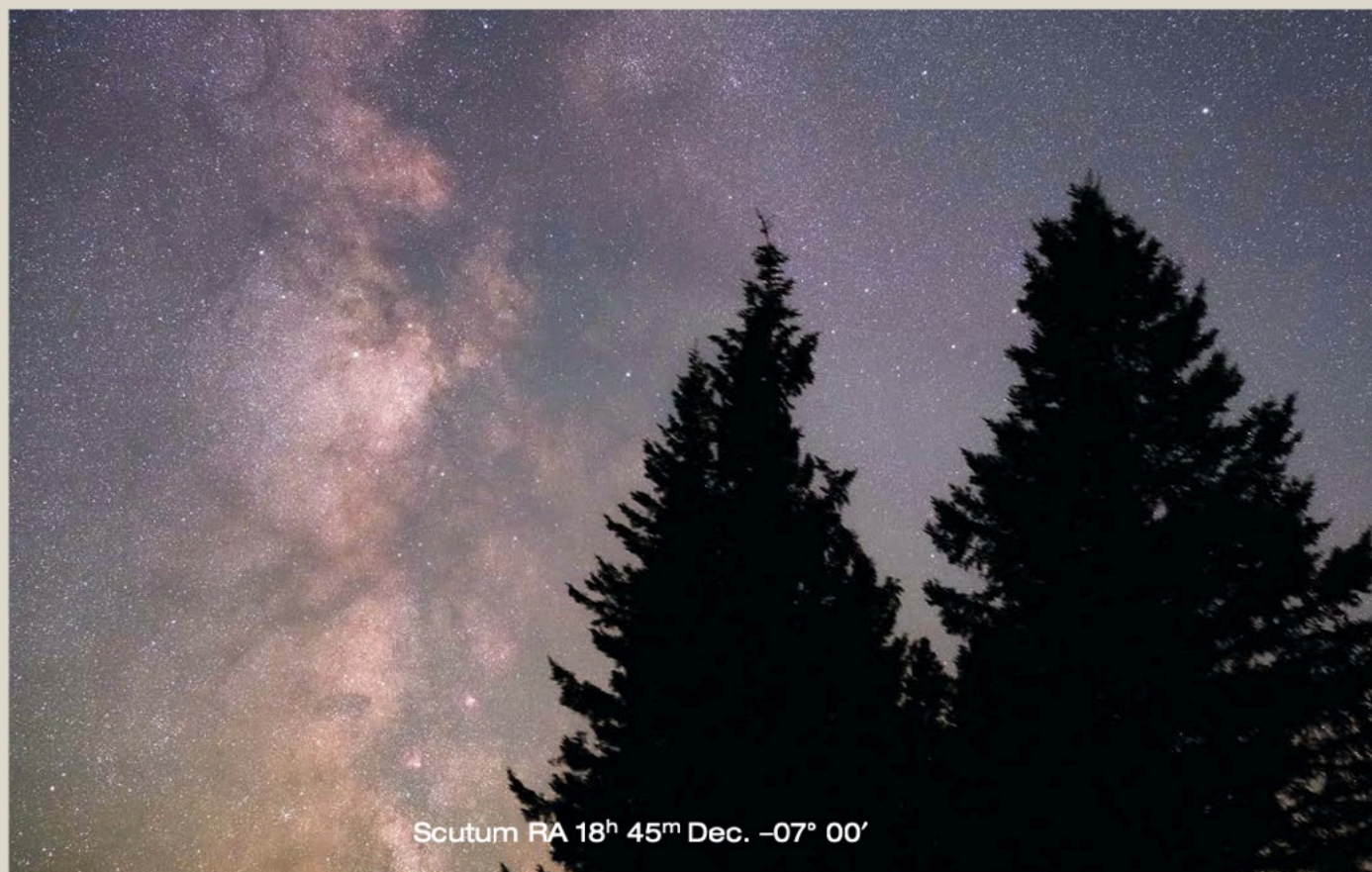
▲ **PUFF OF STEAM** The Small Sagittarius Star Cloud appears to emerge from the spout of the Teapot asterism and is one of the prettiest sights in the summer night skies — and you don't need optics to enjoy it.

bisects the Milky Way from Sagittarius all the way to Cygnus. In 15×50 binoculars, I see the Rift impinge irregularly into the unresolved stars of the cloud. On its southeastern edge, the star cloud fades gradually. My 85-mm refractor at 25× shows the round dark nebula **B295**, about 50' in diameter, on the southeastern edge of the cloud some 48' southwest of Gamma (γ) Sagittarii, as well as the small, rectangular **B289** (35' × 7') inside the northwestern edge around 2½° northwest of Gamma. The star cloud is particularly bright just east of B289. With a 24-mm Panoptic (at 25× and a 2.7° field), my refractor reveals a sandpappy texture that hints at a staggering number of ancient and distant stars.

In the cloud's northern reaches, the 8th-magnitude open cluster **NGC 6520** looks tight and grainy in my 85-mm and just 2' wide. My 10-inch reflector with an 8-mm Ethos at

150× opens the cluster beautifully and showcases its blue-white stars. At 5' across, the small foreground dark nebula, **B86**, lies west of the cluster's center and has the 7th-magnitude orange star HD 164562 on its northwestern edge, making the field even more spectacular.

Look for the 10th-magnitude globular cluster **NGC 6522** about 40' northwest of Gamma Sagittarii on the cloud's southeastern edge. The cluster coincides with 1°-wide **Baade's Window**, a fairly dust-free region that reveals stars just 1,800 light-years offset from the galactic center. These stars are brilliant and gritty, more concentrated than the rest of the cloud. In my 10-inch Dob I easily see NGC 6522 along with **NGC 6528**, another 10th-magnitude globular 15' to the east. This memorable field also includes the small (4'), dark nebula **B298** about 5' east-southeast of the center of NGC 6528.



▲ **IN THE SHIELD** Even a small constellation such as Scutum, the Shield, holds not one but two star clouds. The Scutum Star Cloud occupies the northern reaches of the constellation, while you'll find the Gamma Scuti Star Cloud, as the author designates it, in its southern reaches.

Object	Type	Mag(v)	Size	RA	Dec.
B111	Dark nebula	–	120'	18 <sup>h</sup> 50.6 <sup>m</sup>	–04° 57'
B110	Dark nebula	–	11'	18 <sup>h</sup> 50.1 <sup>m</sup>	–04° 48'
B113	Dark nebula	–	11'	18 <sup>h</sup> 51.4 <sup>m</sup>	–04° 19'
B103	Dark nebula	–	4'	18 <sup>h</sup> 39.4 <sup>m</sup>	–06° 40'
M11	Open cluster	5.8	11'	18 <sup>h</sup> 51.1 <sup>m</sup>	–06° 16'
IC 1295	Planetary nebula	12.5	1.5'	18 <sup>h</sup> 54.6 <sup>m</sup>	–08° 50'
NGC 6712	Globular cluster	8.1	9.8'	18 <sup>h</sup> 53.1 <sup>m</sup>	–08° 42'

## Star Clouds in the Sagittarius Arm

Farther northeast lies the spectacular **Small Sagittarius Star Cloud** (M24). You'll find it 2° north of Mu (μ) Sagittarii above the Teapot asterism. Just 2° × 1° in size, the cloud also runs northeast to southwest and fits in the low-power field of my 85-mm scope at 25×. This star cloud may be the single most beautiful patch of sky except possibly for the region in the southerly constellations of Carina and Centaurus around the Eta Carinae Nebula.

Like its larger neighbor, M24 is a gap in the dark dust clouds that offers us a look at nearly unattenuated starlight from 9,000 light-years away in the galaxy's Sagittarius Arm. But the stars here are far bluer and younger than those in the Large Cloud or those near M7. The entire band of the Milky Way would appear as clear and luminescent as M24 if it

weren't for the vast clouds of fine interstellar dust ejected by the nuclear smokestacks of generations of dying stars.

The stars in M24 range from magnitude 6 down to undetectable in my 85-mm at 25× and appear blue-white or even green. In steady air, M24 assumes a shimmering three-dimensional quality. On its northern edge, look for the small, oval dark nebulae **B92** and **B93** (both 15' long). The former has a single 11th-magnitude star near its eastern side that I can just see in my refractor. Both nebulae are foreground objects. The compact open cluster **NGC 6603** also lies within M24 to the northeast. At 11th magnitude and just 4' across, it appears in my refractor at 46× as a fuzzy patch 4' north of the 7th-magnitude orange star HD 167976. In my 10-inch it opens into an irregular and ill-defined group of stars. Some older catalogs misidentify the M24 star

cloud as NGC 6603, which was likely too dim for Messier to observe.

Moving about 5° northeast into Scutum we find a small, vaguely triangular star cloud around 3° east of the Eagle Nebula (M16). The cloud has 5th-magnitude Gamma Scuti at its southwestern corner, where it's particularly bright and dense. It spans about 2° at its base, which extends eastward from Gamma then stretches 3½° northward to 5th-magnitude HD 171391. **B312** lies to the cloud's south. The stars of this **Gamma Scuti Cloud** (as I call it) fall off markedly to the east and more gradually to the west, where a small gulf lies between the star cloud and M16. In my refractor at 25×, the cloud's bone-white stars fill the field and appear slightly granular and less uniform than those in M24, but it's still quite a lovely sight.

Let's move up to the **Scutum Star Cloud**, an anvil-shaped outcropping 5° long running northwest to southeast between Beta (β) and Delta (δ) Scuti. The star cloud joins the broader Milky Way in the southeast. In the northeast it ends abruptly at the prominent 2°-wide bay of **B111**, which harbors two smaller and even darker nebulae, **B110** and **B113**. To the west, the cloud ends at **B103**. Larger than M24 and roughly as bright, the Scutum Star Cloud reveals a splendid starscape that I can partially resolve with averted vision in my 85-mm refractor at 25×.

On the eastern edge of the Scutum Star Cloud we see the spectacular **M11**, the Wild Duck Cluster. Named for its triangular shape resembling a flock of migrating birds, this 6th-magnitude open star cluster spans 11', but it's so packed with stars that it needs substantial magnification to pull it apart. I prefer the view of M11 in my Dob fitted with a 13-mm Ethos, which delivers 92× — the dense cluster of white stars on the more distant starry background is breathtaking.

About 2.7° south-southeast of M11, look for the planetary nebula **IC 1295** and the globular cluster **NGC 6712** about 25' west-northwest of the nebula. At magnitude 12.5, IC 1295

looks dim but obvious in my 10-inch. It spans about 1.5', making it a little larger than the Ring Nebula (M57). At 92× the almost-10'-wide, 8.1-magnitude globular appears noticeably brighter than the pale glow of the planetary. The charts of the *interstellarum Deep Sky Atlas* label NGC 6712 as the "Weird Globular." The cluster is somewhat peculiar to astronomers as it appears to have a dearth of low-mass stars compared to other globulars. Such stars may have been yanked away by external gravitational forces as the cluster passes through the galaxy.

Moving on, look about 3° northwest of Gamma Aquilae (Tarazed) to see another pleasing star cloud that spans 4° × 2°. As with the other star clouds described here, it stretches in a northeast-to-southwest direction. Larger than M24 but not nearly as scintillating, the **Gamma Aquilae Star Cloud**, as I've dubbed it, appears uniform in both my 15×50 binoculars and in my refractor at 25× except for the single irregular dark nebula, **B337**, which is about 3' long and lies just northeast of center. The cloud fades to the northeast into the Milky Way. To the west it drops off suddenly in a region of darkness nearly as large as the star cloud itself. The southern edge of this dark patch interrupts the starry haze for about 1°. Southwest of this dark bay lies a protruding patch of stars about 1° wide that resembles a miniature version of the Scutum Star Cloud and appears just as bright in my refractor.

While you're exploring here, look about 1½° west of Gamma Aquilae to take in the inky-dark fingers of **B142** and **B143** that comprise the irregular region, a bit less than 1° long, known as Barnard's E. The view of orange Gamma and the unmistakable shape of the nebulae deliver a superb sight in my 85-mm at 25×.

Continuing on our northeasterly route along the Milky Way let's stop briefly in Sagitta, which harbors a dense star field next to the Great Rift to the north and east. Barnard noted this small **Sagitta Star Cloud** (again, my moniker), less than 1° across, centered about 12' north-northeast of a line between Alpha (α) and Beta Sagittae. Sure enough, as I aim my refractor with the 13-mm Ethos in this direction, I see a shimmering patch of unresolved blue-white stars that sticks out from the broader Milky Way to the east and south. The dark nebula **LDN 731**, about as large as the cloud, lies immediately to its west.

**Gamma Scuti RA 18<sup>h</sup> 33<sup>m</sup> Dec. -14° 20'**

Object	Type	Size	RA	Dec.
B312	Dark nebula	100' × 30'	18 <sup>h</sup> 32.2 <sup>m</sup>	-15° 35'

**Gamma Aquilae RA 19<sup>h</sup> 31<sup>m</sup> Dec. +11° 38'**

Object	Type	Size	RA	Dec.
B337	Dark nebula	3'	19 <sup>h</sup> 37.0 <sup>m</sup>	+12° 24'
B142	Dark nebula	40'	19 <sup>h</sup> 39.7 <sup>m</sup>	+10° 31'
B143	Dark nebula	60'	19 <sup>h</sup> 41.4 <sup>m</sup>	+11° 00'

**Sagitta RA 19<sup>h</sup> 41<sup>m</sup> Dec. +18° 07'**

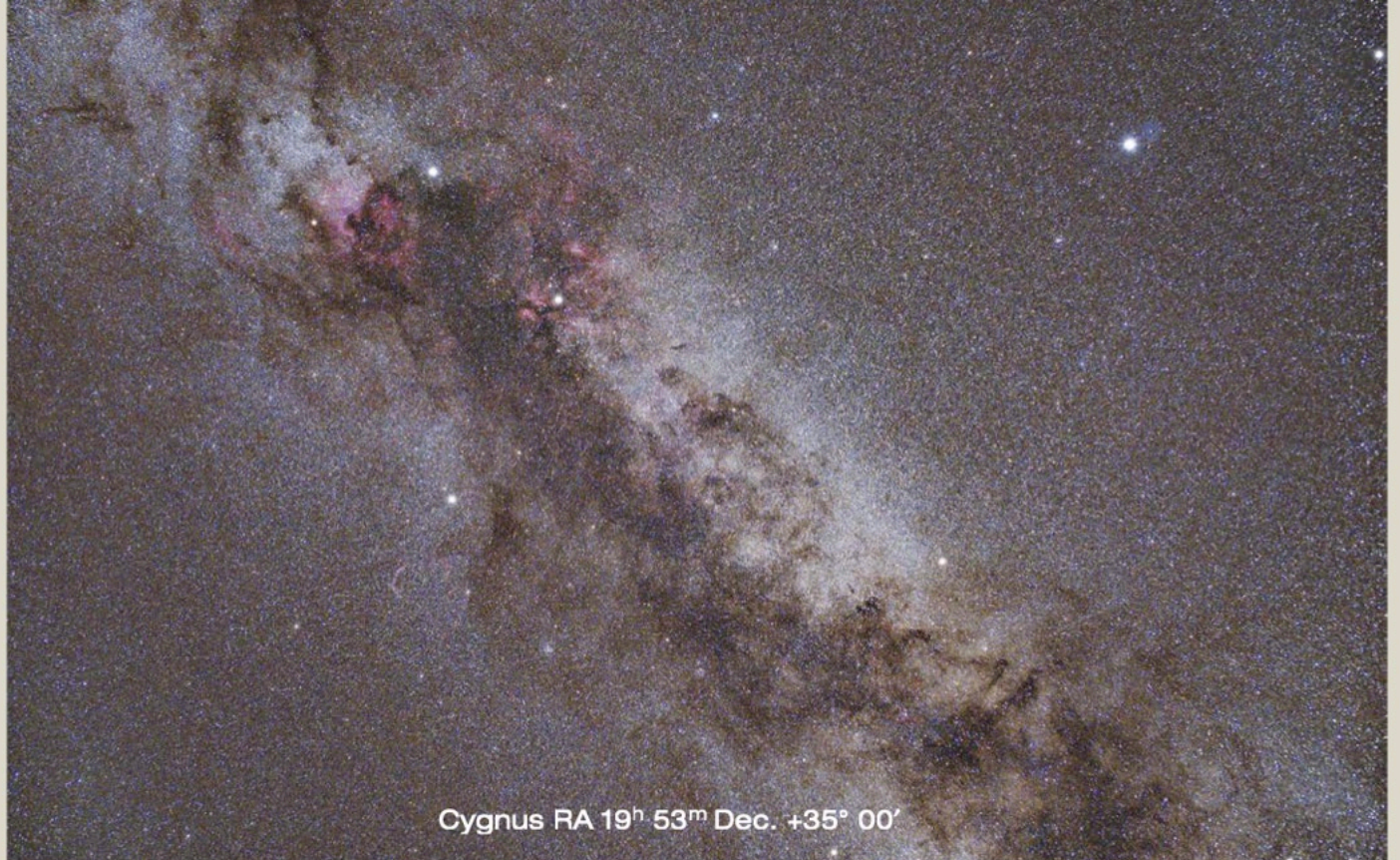
Object	Type	Size	RA	Dec.
LDN 731	Dark nebula	30'	19 <sup>h</sup> 38.2 <sup>m</sup>	+17° 37'

**The Northern Milky Way**

At last we arrive at the **Cygnus Star Cloud**, the brightest section of the northern Milky Way and the largest cloud on this tour. It spans 16° from Beta Cygni (Albireo) in the southwest to Gamma Cygni (Sadr) in the northeast. To the northwest it blends into the broader Milky Way; to the southeast it disappears into the dark nebulae of the Great Rift. We see this cloud's stars through a gap in interstellar dust in the Orion-Cygnus Arm of the Milky Way.

The Cygnus Star Cloud looks spectacular even without optics, but it's especially beautiful in my super-wide-angle 2.1×42 binoculars, an ideal instrument for observing it. Near Albireo the cloud appears orderly, uniform, and mostly unre-





Cygnus RA 19<sup>h</sup> 53<sup>m</sup> Dec. +35° 00'

▲ **GLORIOUS CYGNUS** You'll find the crowning glory of summer's shimmering sights in the celestial Swan. Overhead on August nights is the Cygnus Star Cloud. But do spend some time on its neighboring targets — you'll likely return again and again.

Object	Type	Mag(v)	Size	RA	Dec.
B144	Dark nebula	—	270' × 90'	19 <sup>h</sup> 58.7 <sup>m</sup>	+35° 20'
IC 1318	Emission nebula	—	50' × 30'	20 <sup>h</sup> 22.2 <sup>m</sup>	+40° 15'
NGC 6910	Open cluster	7.4	10'	20 <sup>h</sup> 23.2 <sup>m</sup>	+40° 47'
M29	Open cluster	6.6	10'	20 <sup>h</sup> 24.1 <sup>m</sup>	+38° 30'
NGC 7000	Emission nebula	5.0	120' × 100'	20 <sup>h</sup> 59.3 <sup>m</sup>	+44° 31'

solved aside from a few 6th- to 8th-magnitude foreground stars. I see a bright patch about 1° southeast of a line between Albireo and Phi (φ) Cygni. About 2° southeast of 3.9-magnitude Eta (η) Cygni you'll find three tiny clouds, each around 1° across, which pop in my 15×50 binos. Near the center of the Cygnus cloud lies **B144**, with Eta on its southwestern edge. About 4.5° long and 1.5° wide, this dark nebula is easily visible without optics in a good sky.

Towards Sadr, the cloud blends into patches of darkness and bright nebulosity. Look for a dark channel ¼° south of Sadr, with the brightest parts of the **IC 1318**, the Butterfly Nebula, on either side. I see the emission nebula's ghostly glow in my refractor with the 13-mm Ethos. The field includes the small Y-shaped open cluster **NGC 6910** with two 7th-magnitude yellow-white stars and a handful of fainter 9th- and 10th-magnitude glints covering 10'. When I nudge the scope to put Sadr at the northern edge of the field, the distinctive, 6.6-magnitude open cluster **M29** pops into view to the south. It looks like two parentheses of three 9th-magnitude stars, each with a few fainter stars sprinkled in.

We'll end near the **North America Nebula** (NGC 7000), which Barnard calls "a splendid mixture of stars and nebulos-

ity," about 3° east of Deneb (Alpha Cygni). While the nebula is visually intriguing, a stunning view lies 2° northeast of its center, where we see a brilliant star cloud just beyond the nebula's "Alaska." With a diameter of about 2°, the cloud equals M24 and the Scutum Star Cloud in brightness and beauty, especially for observers at northerly latitudes who can view it nearly overhead. In my 85-mm at 46×, I see resolved 9th- and 10th-magnitude stars in a truly spectacular field. Nudging the scope 2° west across a dark gulf reveals yet another star cloud of equal size but slightly lesser brightness.

More star clouds lie along the Milky Way, but I'll let you sweep the sky to discover your own favorites. In time, you may begin to navigate the best parts of the summer sky not by constellation but by the prominent clots of stars and dark nebulae along this starry backbone of the night.

■ Contributing Editor **BRIAN VENTRUDDO** is a writer, scientist, and longtime amateur astronomer based in Calgary, Canada. He explores the Milky Way on short summer nights with binoculars, telescopes, cameras, or just with the unaided eye. He writes about astronomy and stargazing at his website **CosmicPursuits.com**.