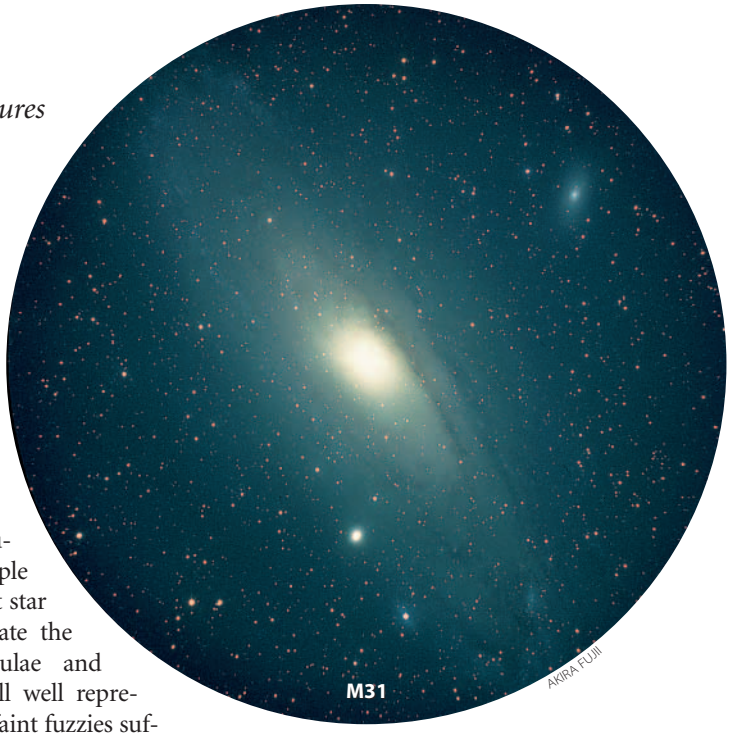
111 Deep-Sky Wonders for Light-Polluted Skies

Bright skies aren't empty skies. See for yourself how many treasures lie hidden in the glow of a city sky. | **By James Mullaney**

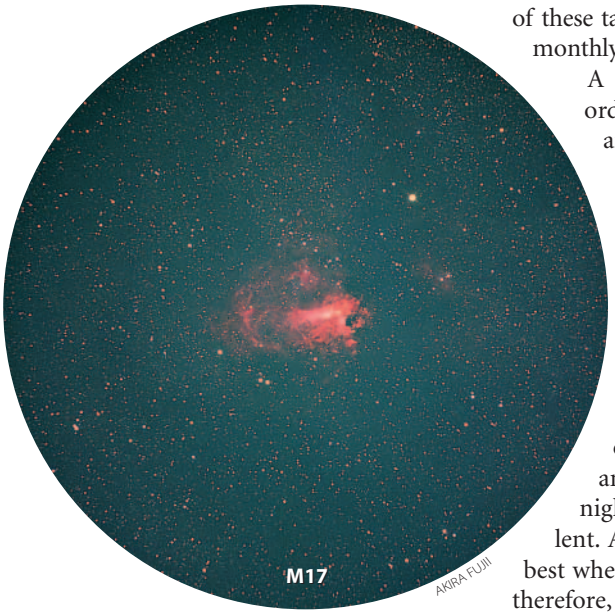


Where I live, 30 miles west of downtown Philadelphia (near historic Valley Forge, Pennsylvania), the glow of the nighttime sky is often bright enough that I can read my star charts without the aid of a red flashlight. Sadly, for much of the stargazing community, this is a pretty typical situation. Yet despite such blatant intrusions on the once sacred darkness of the night sky, many deep-sky wonders can still be seen and enjoyed in a small telescope. In fact, some keen-eyed city dwellers have even been able to glimpse the brightest quasar, 13th-magnitude 3C 273 in Virgo. Considering that the object is at a distance of around 2 *billion* light-years, it is amazing that it can be seen at all under bright conditions, let alone with apertures as small as 5 or 6 inches!

Online

Want expert tips on observing celestial objects? You'll find plenty at **SkyandTelescope.com /observing/objects**

Presented here is a sampling of 111 deep-sky showpieces scattered around the heavens, most all visible from midnorthern latitudes through even the brightest of skies. Since stars have the highest per-unit-area brightness, double and multiple stars and bright star clusters dominate the selection. Nebulae and galaxies are still well represented even though these faint fuzzies suffer the most from light pollution. You can readily find all of them within their respective constellations using a good star atlas such as *Sky Atlas 2000.0,* and the vast majority are plotted in more basic atlases and on detailed star maps. In fact, many of these targets appear on this magazine's monthly centerfold star map.

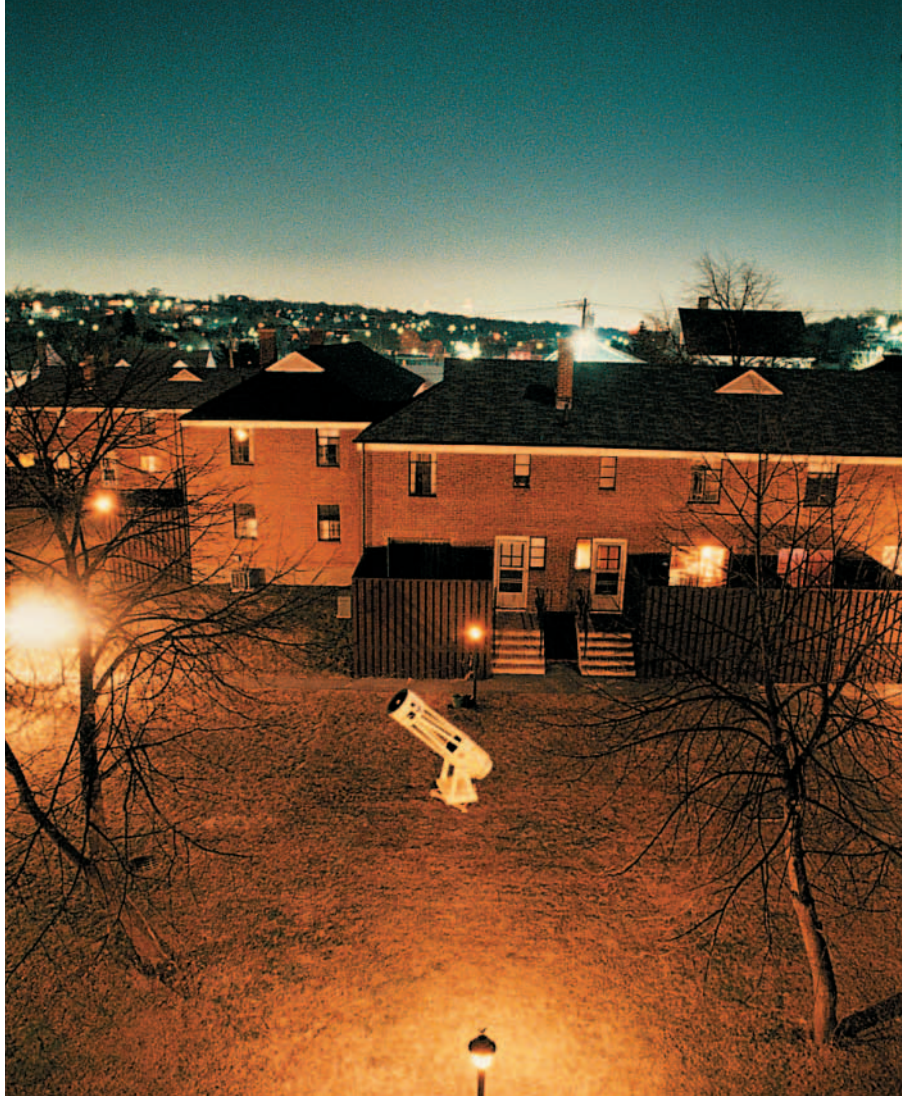


A few observing hints are in order. While low magnifications and wide fields of view are typically used for finding deep-sky objects, higher magnification has the benefit of darkening the background sky — something to keep in mind when you're looking through light pollution. Close doubles and tight clusters (especially globulars) are best seen on nights of steady seeing, while nebulae and galaxies should be saved for nights when transparency is excellent. All deep-sky objects are at their best when on or near the meridian and, therefore, highest in the sky.

Use direct vision where color perception and resolution are important, and averted vision (looking slightly to one side of the object) for seeing faint details. In the latter case, a dark opaque cloth covering your head down to your shoulders will help prevent unwanted light from streetlights, passing cars, and the glowing sky itself from ruining your dark adaptation. And finally, as a rule, the later at night you observe, the less light pollution you will have to contend with as businesses close, neighbors go to bed, and the busy world around you shuts down for the night.

Stars, Stars, and More Stars

Although observers often overlook the heavenly hues of bright stars, even under badly light-polluted skies these objects shine with undiminished splendor. Dazzling, blue-white gems like Sirius, Vega, and Spica contrast wonderfully with the warm gold, topaz, and orange hues of stars like Capella, Arcturus, and Aldeba-



Bright sky and telescope? While a brightly lit suburban sky may seem like a veritable deep-sky desert, there are plenty of sights that retain much of their splendor even in less-than-ideal conditions. Courtesy Dennis di Cicco.

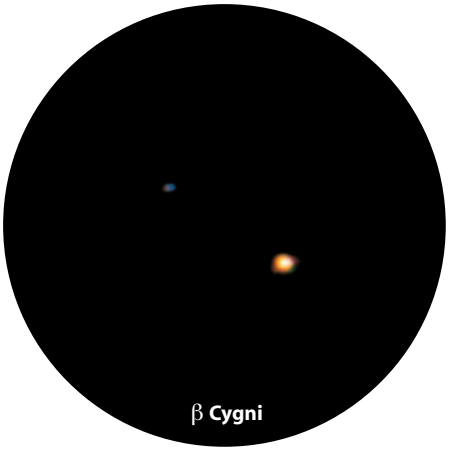
ran and the ruddy supergiants Betelgeuse and Antares. And as the great observer William H. Pickering pointed out long ago, few celestial sights evoke as much real excitement at the telescope as a bright star rising or setting with prismatic rays flashing from its stellar heart.

There are also many fainter naked-eye stars (most of them variable) of a deep red or crimson hue — stunning sights like Herschel's Garnet Star (μ Cephei) and La Superba (Y Canum Venaticorum), or Hind's Crimson Star (R Leporis) when at its brightest.

Literally thousands of double stars lie within reach of even the smallest telescope — and no two pairs look exactly alike. Many show up as well under light pollution and moonlight as through the darkest of skies. The vivid hues of bright, contrasting color pairs are sights never to be forgotten. Who among us doesn't remember our first view of the magnificent topaz and cerulean blue of Albireo? How about the orange and aquamarine of γ Andromedae, or the red and green of α Herculis, or the vivid oranges and blues of 24 Comae Berenices, δ Cephei , ι Cancri (the Albireo of spring), and 145 Canis Majoris (the Albireo of winter)? And these are only a few of the colored doubles on our list.

White and off-white doubles (especially blue-white ones) can also be very striking sights. Just look at the diamonds forming Castor or the twin "eyes" of nearly equal pairs like γ Arietis or Porrima (γ Virginis). Some blue-white doubles display a striking brightness difference between components; one of the best examples in the sky is the bluish supergiant Rigel.

There are also many stunning multiple stars featuring three or more resolvable members. The best-known example is the famed Double-Double (ε Lyrae). Its four suns are all white. For a colorful quadruple system, take a look at ν Scorpii. The most spectacular triple groupings are the pale golden components of Herschel's Wonder Star (β Monocerotis) and o^1 Cygni — a striking reddish orange, white, and blue trio visible even in binoculars!



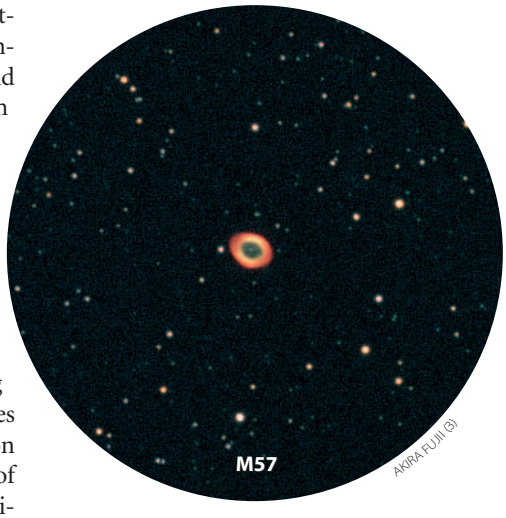
Spectacular Star Clusters

From double and multiple stars we segue to larger aggregations — open clusters, containing dozens to upward of a thousand members. Indeed, some multiple stars like h 3780 in Lepus are also classified as star clusters (NGC 2017). Even richer are globular clusters — beehive-like swarms of up to a million suns!

Among the best-known and brightest open clusters are a number visible to the unaided eye that are also beautiful sights in binoculars, even in fairly heavy light pollution. The famed Pleiades (M45), Hyades, and Beehive (M44) Clusters are three examples. The superb Double Cluster (NGC 869 and NGC 884), also barely visible without optical aid, is a truly spectacular sight in low-power telescopes. Some of the finest stellar jewel boxes for telescopic viewing are big, bright, and splashy Lassell's Delight (M35), the Butterfly Cluster (M6), its neighbor M7, and the radiant Wild Duck Cluster (M11).

Among the best globulars for Northern Hemisphere observers are the spectacular

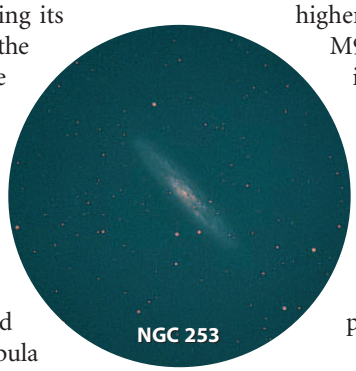
Hercules Cluster (M13) and M22 in Sagittarius. All the globulars on our list are incredible sights when viewed in 6-inch and larger instruments at medium to high magnifications, even under bright skies. Those living farther south shouldn't miss Omega (ω) Centauri, the finest of all globulars — a naked-eye object and a marvelous sight in any telescope, despite its low elevation.



Notable Nebulae

The most spectacular of all the glowing stellar nurseries visible from northern skies is without question the magnificent Orion Nebula, M42. Embedded at the center of this mottled greenish cloud is the Trapezium — an amazing quadruple star in small scopes and a multiple system (actually a small cluster). The only other diffuse nebulae really suitable for light-polluted skies are the big and bright Lagoon Nebula (M8, with its attendant cluster NGC 6530) and the Swan Nebula (M17).

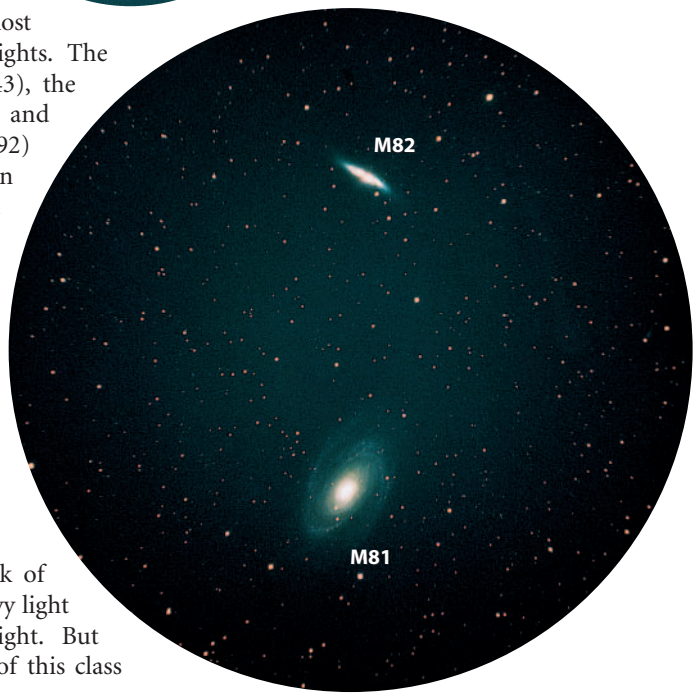
The two best planetary nebulae in northern skies are the famed Ring Nebula (M57) and the Dumbbell Nebula (M27), the former showing its central hole in even the smallest scopes, while the latter is so conspicuous that it's visible in binoculars. There are many smaller, brighter examples of these dying suns that easily punch through light pollution and moonlight. The vivid greenish blue Saturn Nebula (NGC 7009) and Jupiter's Ghost (NGC 3242) are pleasing sights. The Cat's Eye Nebula (NGC 6543), the Blue Snowball (NGC 7662), and the Eskimo Nebula (NGC 2392) are three more showpieces in this class. One object often included with planetaries is the well-known Crab Nebula (M1), though it is actually a supernova remnant. The Crab is the brightest such object in the heavens and is visible even in brightly lit skies when medium magnification is used.



Galaxies Galore

Many observers seldom think of looking at galaxies under heavy light pollution or bright moonlight. But there's at least one member of this class that's virtually always visible: the famed Andromeda Galaxy (M31). I've often observed it in full moonlight, marveling that I could still see details like the eerie pale greenish white glow of its nuclear bulge and the dark bands of its spiral arms.

Another good target is the big Sculptor Galaxy (NGC 253), largely ignored due to its relatively low declination. Much higher in the sky is cometlike M94 and the stunning pair in Ursa Major, M81 and M82 — one an inclined pinwheel, the other cigar-shaped. The famed Whirlpool Galaxy (M51) is a beautiful face-on spiral, but it can be disappointing in really light-polluted skies because of



111 Treasures for Light-Polluted Skies

Object	Constellation	Type	R.A. (2000.0)	Dec.	Magnitude(s)	*Sky Atlas 2000.0* chart number
M31	Andromeda	Galaxy	0h 42.7m	+41° 16′	3.5	4
NGC 253	Sculptor	Galaxy	0h 47.6m	–25° 17′	7.1	18
η Cassiopeiae	Cassiopeia	Double star	0h 49.1m	+57° 49′	3.5, 7.2	1
γ Arietis	Aries	Double star	1h 53.5m	+19° 18′	3.9, 3.9	4
γ Andromedae	Andromeda	Double star	2h 03.9m	+42° 20′	2.1, 4.8	4
NGC 869/884	Perseus	Open cluster	2h 21.0m	+57° 08′	4.3, 4.4	1
ι Cassiopeiae	Cassiopeia	Multiple star	2h 29.1m	+67° 24′	4.5, 6.9	1
M34	Perseus	Open cluster	2h 42.1m	+42° 45′	5.2	4
θ Eridani	Eridanus	Double star	2h 58.3m	–40° 18′	3.2, 4.1	18
M45 (Pleiades)	Taurus	Open cluster	3h 47.0m	+24° 07′	1.5	4
32 Eridani	Eridanus	Double star	3h 54.3m	–2° 57′	4.7, 5.9	11
Hyades	Taurus	Open cluster	4h 20m	+16°	—	11
Aldebaran	Taurus	Star	4h 36.1m	+16° 31′	0.9	11
R Leporis	Lepus	Star	4h 59.6m	–14° 48′	8.1	11
Rigel	Orion	Double star	5h 14.7m	–8° 12′	0.1, 6.8	11
Capella	Auriga	Star	5h 16.9m	+46° 00′	0.1	5
M1	Taurus	Nebula	5h 34.5m	+22° 01′	8.4	5
M42	Orion	Nebula	5h 35.4m	–5° 27′	3.7	11
σ Orionis	Orion	Multiple star	5h 38.7m	–2° 36′	3.7, 6.3, 6.7, 8.8	11
h 3780	Lepus	Multiple star*	5h 39.3m	–17° 51′	6.4, 7.7, 8.2, 8.9, 9.5	11
γ Leporis	Lepus	Double star	5h 44.5m	–22° 27′	3.6, 6.3	19
M37	Auriga	Open cluster	5h 52.3m	+32° 33′	5.6	5
Betelgeuse	Orion	Star	5h 55.3m	+7° 24′	0.5	11
M35	Gemini	Open cluster	6h 08.9m	+24° 21′	5.1	5
β Monocerotis	Monoceros	Multiple star	6h 28.8m	–7° 02′	4.7, 5.2, 6.2	11
Sirius	Canis Major	Star	6h 45.3m	–16° 43′	–1.4	12
M41	Canis Major	Open cluster	6h 46.0m	–20° 45′	4.5	19
12 Lyncis	Lynx	Multiple star	6h 46.2m	+59° 27′	5.4, 6.0, 7.3	1
145 Canis Majoris	Canis Major	Double star	7h 16.6m	–23° 19′	4.8, 6.0	19
NGC 2392	Gemini	Planetary nebula	7h 29.2m	+20° 55′	9.2	5
Castor	Gemini	Double star	7h 34.6m	+31° 53′	2.0, 2.9	5
κ Puppis	Puppis	Double star	7h 38.8m	–26° 48′	3.8, 4.0	19
ζ Cancri	Cancer	Multiple star	8h 12.2m	+17° 39′	5.6, 6.0, 6.3	12
M44	Cancer	Open cluster	8h 40.4m	+19° 40′	3.1	6
ι Cancri	Cancer	Double star	8h 46.7m	+28° 46′	4.0, 6.6	6
M67	Cancer	Open cluster	8h 51.4m	+11° 49′	6.9	12
NGC 2903	Leo	Galaxy	9h 32.2m	+21° 30′	9.0	6
M81	Ursa Major	Galaxy	9h 55.6m	+69° 04′	6.9	2
M82	Ursa Major	Galaxy	9h 55.8m	+69° 41′	8.4	2
γ Leonis	Leo	Double star	10h 20.0m	+19° 51′	2.6, 3.8	6
NGC 3242	Hydra	Planetary nebula	10h 24.8m	–18° 38′	7.8	20
M95	Leo	Galaxy	10h 44.0m	+11° 42′	9.7	13
M96	Leo	Galaxy	10h 46.8m	+11° 49′	9.2	13
M105	Leo	Galaxy	10h 47.8m	+12° 35′	9.3	13
54 Leonis	Leo	Double star	10h 55.6m	+24° 45′	4.3, 6.3	6
ξ Ursae Majoris	Ursa Major	Double star	11h 18.2m	+31° 32′	4.3, 4.8	6
M65	Leo	Galaxy	11h 18.9m	+13° 05′	9.3	13
M66	Leo	Galaxy	11h 20.2m	+12° 59′	9.0	13
NGC 3628	Leo	Galaxy	11h 20.3m	+13° 36′	9.5	13
3C 273	Virgo	Quasar	12h 29.1m	+2° 03′	12.7	14
M49	Virgo	Galaxy	12h 29.8m	+8° 00′	8.4	13
M87	Virgo	Galaxy	12h 30.8m	+12° 24′	8.6	14
24 Comae Berenices	Coma Berenices	Double star	12h 35.1m	+18° 23′	5.1, 6.3	14
M104	Virgo	Galaxy	12h 40.0m	–11° 37′	8.0	14
γ Virginis	Virgo	Double star	12h 41.7m	–1° 27′	3.4, 3.5	14
Y Canum Venaticorum	Canes Venatici	Star	12h 45.1m	+45° 26′	5.2	7

* Also listed as open cluster NGC 2017.

111 Treasures for Light-Polluted Skies *(continued)*

Object	Constellation	Type	R.A. (2000.0)	Dec.	Magnitude(s)	*Sky Atlas 2000.0* chart number
M94	Canes Venatici	Galaxy	12h 50.9m	+41° 07′	8.2	7
α Canum Venaticorum	Canes Venatici	Double star	12h 56.0m	+38° 19′	2.9, 5.6	7
M64	Coma Berenices	Galaxy	12h 56.7m	+21° 41′	8.5	7
Mizar	Ursa Major	Double star	13h 23.9m	+54° 56′	2.2, 3.9	2
Spica	Virgo	Star	13h 25.3m	–11° 10′	1.0	14
NGC 5128	Centaurus	Galaxy	13h 25.5m	–43° 01′	7.0	21
ω Centauri	Centaurus	Globular cluster	13h 26.8m	–47° 29′	3.7	21
M51	Canes Venatici	Galaxy	13h 29.9m	+47° 12′	8.4	7
M83	Hydra	Galaxy	13h 37.0m	–29° 52′	7.5	21
M3	Canes Venatici	Globular cluster	13h 42.2m	+28° 23′	6.3	7
Arcturus	Boötes	Star	14h 15.9m	+19° 11′	–0.1	7
ε Boötis	Boötes	Double star	14h 45.0m	+27° 04′	2.3, 4.5	7
M5	Serpens (Caput)	Globular cluster	15h 18.6m	+2° 05′	5.7	14
μ Boötis	Boötes	Multiple star	15h 24.5m	+37° 23′	4.3, 7.0, 7.6	7
ζ Coronae Borealis	Corona Borealis	Double star	15h 39.4m	+36° 38′	5.0, 6.0	7
ξ Scorpii	Scorpius	Double star	16h 04.4m	–11° 22′	4.8, 7.3	15
β Scorpii	Scorpius	Double star	16h 05.4m	–19° 48′	2.6, 4.9	22
ν Scorpii (AB)	Scorpius	Multiple star	16h 12.0m	–19° 28′	4.4, 5.4	22
ν Scorpii (CD)	—	—	—	—	6.7, 7.8	
M4	Scorpius	Globular cluster	16h 23.6m	–26° 32′	5.4	22
Antares	Scorpius	Star	16h 29.6m	–26° 27′	1.1	22
M13	Hercules	Globular cluster	16h 41.7m	+36° 28′	5.8	8
α Herculis	Hercules	Double star	17h 14.6m	+14° 23′	3.5, 5.4	15
M92	Hercules	Globular cluster	17h 17.1m	+43° 08′	6.5	8
ν Draconis	Draco	Double star	17h 32.2m	+55° 11′	4.9, 4.9	3
M6	Scorpius	Open cluster	17h 40.3m	–32° 16′	4.2	22
M7	Scorpius	Open cluster	17h 53.8m	–34° 47′	3.3	22
M23	Sagittarius	Open cluster	17h 56.9m	–19° 01′	5.5	22
NGC 6543	Draco	Planetary nebula	17h 58.6m	+66° 38′	8.1	3
95 Herculis	Hercules	Double star	18h 01.5m	+21° 36′	5.0, 5.2	8
M8	Sagittarius	Nebula	18h 03.8m	–24° 23′	4.6	22
70 Ophiuchi	Ophiuchus	Double star	18h 05.5m	+2° 30′	4.0, 6.0	15
M24	Sagittarius	Starcloud	18h 17.4m	–18° 36′	4.6	15
M17	Sagittarius	Nebula	18h 21.1m	–16° 11′	6.0	15
M22	Sagittarius	Globular cluster	18h 36.4m	–23° 54′	5.2	22
Vega	Lyra	Star	18h 37.0m	+38° 47′	0.0	8
ε Lyrae (AB)	Lyra	Multiple star	18h 44.3m	+39° 40′	5.0, 6.1	8
ε Lyrae (CD)	—	—	—	—	5.2, 5.5	
M11	Scutum	Open cluster	18h 51.1m	–6° 16′	5.8	16
M57	Lyra	Planetary nebula	18h 53.6m	+33° 02′	8.8	8
θ Serpentis	Serpens	Double star	18h 56.2m	+4° 12′	4.6, 5.0	16
Albireo	Cygnus	Double star	19h 30.7m	+27° 58′	3.1, 5.1	8
M55	Sagittarius	Globular cluster	19h 40.0m	–30° 58′	6.3	22
M71	Sagitta	Globular cluster	19h 53.8m	+18° 47′	8.4	8
M27	Vulpecula	Planetary nebula	19h 59.6m	+22° 43′	7.3	8
o^1 Cygni	Cygnus	Multiple star	20h 13.6m	+46° 44′	3.8, 4.8, 7.0	9
α Capricorni	Capricornus	Double star	20h 18.1m	–12° 33′	3.6, 4.2	16
γ Delphini	Delphinus	Double star	20h 46.7m	+16° 07′	4.3, 5.1	16
NGC 7009	Aquarius	Planetary nebula	21h 04.2m	–11° 22′	8.0	16
61 Cygni	Cygnus	Double star	21h06.9m	+38° 45′	5.2, 6.0	9
M15	Pegasus	Globular cluster	21h 30.0m	+12° 10′	6.3	16
M2	Aquarius	Globular cluster	21h 33.5m	–0° 49′	6.6	17
μ Cephei	Cepheus	Star	21h 43.5m	+58° 47′	4.0	3
ζ Aquarii	Aquarius	Double star	22h 28.8m	–0° 01′	4.3, 4.5	17
δ Cephei	Cepheus	Double star	22h 29.2m	+58° 25′	4.1, 6.3	3
NGC 7662	Andromeda	Planetary nebula	23h 25.9m	+42° 33′	8.3	9
σ Cassiopeiae	Cassiopeia	Double star	23h 59.0m	+55° 45′	5.0, 7.1	3

its low surface brightness. Edge-on galaxies like the Sombrero Galaxy (M104) usually fare much better in bright skies.

Other bright galaxies worth seeking out are the Black Eye Galaxy (M64) and the Sunflower Galaxy (M63). One of my favorites — because it's easy to find and all by itself where it can't be confused with other galaxies — is NGC 2903 in Leo.

Saving the best for last, the finest galaxy, bar none (and, in my opinion, the finest of all deep-sky objects), is our own home galaxy, the Milky Way. True, light pollution wipes out much of its visibility to the unaided eye, but the situation is totally different in a telescope. Try sweeping for its expansive starclouds in regions like Cygnus, Scutum, and Sagittarius with a low- to medium-power eyepiece, and you'll be amazed at what you can see. One of the richest parts of our vast star city is the magnificent Small Sagittarius Starcloud (M24) — truly a starry wonderland.

While it's true that pollution in its various forms has sapped much of the quality out of modern living, the showpieces presented here at least illustrate that observers don't need to let bright skies rob them of the joys of stargazing. No matter where you live, the stars are still there for you to enjoy.

James Mullaney *has logged nearly 25,000 hours of stargazing since 1952. In addition to more than 500 observing-related articles, he is the author of the book* Celestial Harvest: 300-Plus Showpieces of the Heavens for Telescope Viewing and Contemplation, *from Dover Publications.*

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