December

OBJECT #907	NGC 1582
Constellation	Perseus
Right ascension	4h32m
Declination	43°51′
Magnitude	7.0
Size	24′
Type	Open cluster

Our next target is an attractive cluster that lies 5.4° west of magnitude 3.0 Epsilon (ε) Aurigae. Because of the brightness differences between two groups of stars in this object, NGC 1582 presents, in effect, two "clusters" superimposed. You will need a 10-inch or larger telescope to see what I mean. The first cluster contains 10 stars brighter than 10th-magnitude. The luminary of this group, magnitude 8.6 SAO 39578, sits near the eastern edge. The other cluster contains several dozen fainter stars that fill in the gaps left by the first cluster.

OBJECT #908	The Hyades
Constellation	Taurus
Right ascension	4h27m
Declination	16°00′
Magnitude	0.5
Size	330′
Type	Open cluster
Other names	Melotte 25, Caldwell 41

The V-shaped Hyades star cluster (α, θ^1, θ^2, γ, Δ, and ε Tauri) is impossible to miss in Taurus. It's the neighboring cluster of the better-known Pleiades (M45). And although the Hyades is closer, larger,

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and brighter than the Pleiades, it doesn't look as spectacular: The bright stars just spread out too much.

In Greek mythology, the Hyades were the daughters of Atlas and Pleione (or Aethra), and half-sisters of the Pleiades. Regarding their name, Richard Hinckley Allen writes in *Star Names and Their Meanings*, "Ovid called them Sidus Hyantis, after their earthly brother, Hyas, whose name, after all, would seem to be the most natural derivation of the title; and it was their grief at his death which gave additional point to Horace's *tristes Hyadas*, and, in one version of their story, induced Jove to put them in the sky."

The Hyades has a diameter of more than 5°, so it only looks like a cluster to your naked eyes or through binoculars. If you train a telescope toward this object, focus in on the many fine double stars the cluster contains.

Oh, and one further note: Aldebaran (Alpha [α] Tauri), Taurus' brightest star, does not belong to the Hyades. Aldebaran lies only 65 light-years from Earth while the stars of the Hyades cluster are 150 light-years away.

OBJECT #909	1 Camelopardalis
Constellation	Camelopardalis
Right ascension	4h32m
Declination	53°55′
Magnitudes	5.7/6.8
Separation	10.3″
Type	Double star
Notes	Blue and white

This pretty binary makes a nice target for northern observers. The primary is sky blue and the secondary is white. Because Camelopardalis is such a faint constellation, find 1 Cam by using the relatively bright Lambda (λ) Persei. Look 5.3° northeast of that magnitude 4.3 star.

OBJECT #910	NGC 1617
Constellation	Dorado
Right ascension	4h32m
Declination	−54°36′
Magnitude	10.5
Size	4.3′ by 2.1′
Type	Spiral galaxy

Our next object sits 0.5° northwest of magnitude 3.3 Alpha (α) Doradus. Through any size telescope, you'll pick out this reasonably bright galaxy. NGC 1617 has an oblong shape twice as long as wide. Its bright central region takes up half the galaxy's diameter. Outside is a thick halo.

OBJECT #911	NGC 1624
Constellation	Perseus
Right ascension	4h40m
Declination	50°27′
Size	5′ by 5′
Type	Open cluster with nebula

Look 4.6° east-northeast of magnitude 4.1 Mu (μ) Persei, tucked in the far northeastern corner of Perseus, for this intriguing cluster surrounded by a nebula. The cluster holds a dozen faint stars that nevertheless appear distinctly as a cluster because they're tightly packed. A uniform, gauzy glow surrounding the stars suggests dew on the optics.

OBJECT #912	NGC 1647
Constellation	Taurus
Right ascension	4h46m
Declination	19°07′
Magnitude	6.4
Size	40′
Type	Open cluster
Other name	The Pirate Moon Cluster

From magnitude 0.9 Aldebaran (Alpha [α] Tauri), move 3.5° northeast, and you'll encounter this bright cluster. Sharp-eyed observers can spot it from a dark site with their naked eyes, and, if you can't, binoculars or a finder scope will bring it in.

You'll see 30 stars through a 4-inch telescope, and increasing the aperture increases the number of stars. Increase the magnification past 150×, and look for lots of nice, close pairs. This cluster contains more than its fair share.

Astronomy magazine Contributing Editor Stephen James O'Meara bestowed the name Pirate Moon Cluster on NGC 1647. He said that, through 7×50 binoculars, it appeared as a round ghostly glow with an apparent size larger than that of the Full Moon. Furthermore, the cluster's stars congregate into disparate bunches, which, according to O'Meara, mimic the dark and bright features we see on the naked-eye Moon.

OBJECT #913	IC 2087
Constellation	Taurus
Right ascension	4h40m
Declination	25°44′
Size	4′ by 4′
Type	Emission nebula

Our next treat lies 3.9° east of magnitude 5.5 Chi (χ) Tauri. Through a 12-inch telescope, it appears as a uniform circular haze. More interesting than the nebula, however, is the surrounding starfield, which seems nearly nonexistent. Step down to your lowest-power eyepiece to see this. Pan 1.5° west-southwest, and you'll encounter Barnard 7, one of the hundreds of dark nebulae cataloged by American astronomer Edward Emerson Barnard.

OBJECT #914	55 Eridani
Constellation	Eridanus
Right ascension	4h44m
Declination	–8°48′
Magnitudes	6.7/6.8
Separation	9.2″
Type	Double star
Notes	Yellow and white

This binary features a pair of equally bright stars with distinctively different colors. In fact, if both components were two magnitudes brighter, this would be a showpiece at winter observing events. The primary appears a deep yellow and the secondary is light blue, blue-white, or whitish, depending on your eyes' color-receptor sensitivity. You'll find 55 Eridani 7.7° due west of brilliant Rigel (Beta [β] Orionis). Within your field of view, you'll also see bluish 56 Eridani, which lies 19′ north-northeast of 55 Eridani.

OBJECT #915	NGC 1664
Constellation	Auriga
Right ascension	4h51m

(continued)	
Declination	43°42′
Magnitude	7.6
Size	18′
Type	Open cluster

You'll find this attractive object 2° west of magnitude 3.0 Epsilon (ε) Aurigae. Through a 4-inch telescope at 100×, you'll see three dozen stars. The background star field in this area is rich, but you'll have no trouble picking out the cluster. The bright star on NGC 1664's southwestern edge is magnitude 7.5 SAO 39807.

OBJECT #916	NGC 1672
Constellation	Dorado
Right ascension	4h46m
Declination	–59°15′
Magnitude	9.8
Size	6.2′ by 3.4′
Type	Spiral galaxy

Scan 0.5° north-northeast of magnitude 5.3 Kappa (κ) Doradus to locate this four-armed barred spiral galaxy. Through your 12-inch telescope, however, you'll need to crank up the magnification to spot just one arm. It begins on the eastern side and curves toward the north.

Object #917 IC 342 Ken and Emilie Siarkiewicz/Adam Block/NOAO/AURA/NSF

OBJECT #917	IC 342
Constellation	Camelopardalis
Right ascension	4h47m
Declination	68°06′
Magnitude	8.4
Size	21.4′ by 20.9′
Type	Spiral galaxy
Other name	Caldwell 5

Our next deep-sky object is IC 342. Many of you are familiar with the NGC catalog. The Index Catalog (abbreviated IC) actually is an extension of the NGC. English astronomer John Louis Emil Dreyer completed the NGC in 1888. It contains some 7,840 objects.

In 1895 and 1908, he added two appendices to the NGC that he called the *First and Second Index Catalogs of Nebulae and Star Clusters*. Entries are the same deep-sky object types, but with a different catalog designation.

IC 342 lies in the far-northern and ultra-faint constellation Camelopardalis the Giraffe. The galaxy sits 3.2° due south of the magnitude 4.6 star Gamma (γ) Camelopardalis.

As it stands, IC 342 is a magnitude 8.4 galaxy. But it would be truly spectacular if intervening Milky Way dust and gas didn't dim it by more than 2 magnitudes.

Visually, IC 342 appears 20′ across, but, even at its magnitude, it's not easy to see because its surface brightness is low. Look for a bright central knot about 30″ across in a rich star field. Surrounding this is a fainter halo 2′ across, while an extremely faint, knotty structure extends over a diameter of 20′.

OBJECT #918	NGC 1679
Constellation	Caelum
Right ascension	4h50m
Declination	–31°59′
Magnitude	11.5
Size	3.0′ by 1.5′
Type	Barred spiral galaxy

Our next target presents a strange face because of several superposed stars. NGC 1679 appears as a thick crescent with a slightly brighter center. A magnitude 12 star lies at the northwest end, and a 13th-magnitude star glimmers in the outer halo to the east. You'll find this galaxy 3.4° east-southeast of magnitude 3.8 Upsilon^2 (υ^2) Eridani.

OBJECT #919	NGC 1714
Constellation	Dorado
Right ascension	4h52m
Declination	–66°56′
Size	1.2′
Type	Emission nebula

This tiny nebula sits on the western edge of the Large Magellanic Cloud a little more than 6° southwest of magnitude 3.8 Beta (β) Doradus. Although it measures only 1′ across, its high surface brightness lets you use high magnification for a detailed view. Through a 10-inch telescope, you'll see a circular glow with a bright northern rim. The magnitude 6.3 star GSC 8889:215 lies only 8″ west.

OBJECT #920	Lepus
Right ascension (approx.)	5h31m
Declination (approx.)	–19°

(continued)	
Size (approx.)	290.29 square degrees
Type	Constellation

Another small constellation you should seek out is Lepus the Hare. In the sky, Lepus sits directly below (that is, south of) Orion. It's a mid-sized constellation. Out of the 88 star patterns that cover the sky, Lepus ranks 51st in size. It covers 290 square degrees, or about 0.7% of the sky.

Lepus has two named stars, magnitude 2.6 Arneb (α Leporis) and magnitude 2.9 Nihal (β Leporis). No meteor showers originate from this constellation.

Lepus is completely visible from any latitude south of 63° north, and completely invisible only from latitudes north of 79° north. The best date to see it (when it lies opposite the Sun in the sky as seen from Earth) is December 14. Conversely, don't look for it around June 15, because that's when the Sun is in Lepus' part of the sky.

OBJECT #921	NGC 1744
Constellation	Lepus
Right ascension	5h00m
Declination	–26°01′
Magnitude	11.3
Size	5.1′ by 2.5′
Type	Barred spiral galaxy

You'll find our next object 3.9° south-southwest of magnitude 3.2 Epsilon (ε) Leporis. NGC 1744 is faint, appearing twice as long as it is wide, oriented north-south. Its core is broad, and the galaxy's edge has an irregular outline.

OBJECT #922	NGC 1755
Constellation	Dorado
Right ascension	4h55m
Declination	–68°11′
Magnitude	9.9
Size	2.6′
Type	Open cluster

Our next target lies in the deep southern sky. It's an odd open cluster located on the western end of the Large Magellanic Cloud's bar. An 8-inch telescope at 100× reveals 20 magnitude 13 and 14 stars packed into an area 2′ across. There's also a strong background glow, which hints at the existence of many fainter stars. A fainter open cluster, NGC 1749, lies 2′ to the west.

OBJECT #923	NGC 1763
Constellation	Dorado
Right ascension	4h57m
Declination	–66°24′
Size	5′ by 3′
Type	Emission nebula

Let's stay near the LMC for our next object, which is part of a group of four emission nebula in an area less than 0.3° across. NGC 1763 appears as a clumpy haze surrounded by an apparent open cluster. Just 7′ south, you'll find NGC 1760. Move 7′ east-southeast from NGC 1763, and you'll encounter NGC 1769. Finally, NGC 1773 lies 9′ east-northeast of NGC 1763.

OBJECT #924	R Leporis
Constellation	Lepus
Right ascension	5h00m
Declination	–14°48′
Magnitude	5.5 to 11.7
Period	432 days
Type	Variable star
Other name	Hind's Crimson Star

You'll find our next target in Lepus near that constellation's border with Eridanus. It lies 3.5° west-northwest of magnitude 3.3 Mu (μ) Leporis. Hind's Crimson Star is one of the sky's reddest points of light. To spot it, use low magnification in an 8-inch or larger telescope. When you've centered R Leporis, ever-so-slightly defocus the image to spread out the star's color, making it easier to see.

This star gets its common name from British astronomer John Russell Hind (1823–1895), who discovered it in 1845.

OBJECT #925	NGC 1778
Constellation	Auriga
Right ascension	5h08m
Declination	37°01′
Magnitude	7.7
Size	8′
Type	Open cluster

Our next target sits almost 2° east-southeast of magnitude 5.1 Omega (ω) Aurigae. Through a 4-inch telescope, you'll see two dozen stars unevenly spread across this cluster's face. Double the aperture to 8 inches, and you'll raise the star count to 50.

OBJECT #926	NGC 1788
Constellation	Orion
Right ascension	5h07m
Declination	–3°21′
Size	5′ by 3′
Type	Reflection nebula

This reflection nebula sits 2° north of magnitude 2.7 Beta (β) Eridani. Through a 10-inch telescope, you'll have no trouble spotting NGC 1788. The bright nebula has a diffuse border and features two lobes. The western one surrounds a 10th-magnitude star while the eastern lobe has a small, bright concentration of light at its center. NGC 1788's south end meets dark nebula LDN 1616. Again, you'll have no trouble spotting it because of the lack of background stars over a 5-arcminute-wide region.

OBJECT #927	Columba the Dove
Right ascension	5h45m
Declination	–35°
Size	270.18 square degrees
Type	Constellation

Columba represents the dove that Noah sent out to test whether the waters from the great biblical flood had receded. It's the only surviving constellation named after an object in the Bible. Columba first appeared in 1592, on a celestial map designed by Dutch astronomer and cartographer Petrus Plancius.

Columba is a constellation most amateur astronomers haven't identified. Well, here's your chance. Find Orion. That's easy enough. Now look south of Orion, and find Lepus. Finally, continue south from Lepus, and you'll end up in Columba.

You'll first notice the constellation's two brightest stars. Phact (Alpha [α] Columbae) shines at magnitude 2.6, and Wasn (Beta [β] Columbae) isn't far behind at magnitude 3.1. From there, you'll find just three other stars brighter than 4th magnitude. Then all you have to do is make a dove out of those stars. Good luck with that!

When you look at Columba, you might want to wave goodbye. This constellation contains the point in the sky away from which our solar system is heading, relative to stars in our neighborhood. Astronomers call this point the solar antapex.

For those of you with large telescopes, there's something at the approximate coordinates of the solar antapex. It's the magnitude 13.2 galaxy IC 2153. Warning: Unless you can set up a large telescope at a dark site, you won't have much luck observing this small faint object.

OBJECT #928	NGC 1792
Constellation	Columba
Right ascension	5h05m
Declination	–37°59′
Magnitude	9.9
Size	5.5′ by 2.5′
Type	Spiral galaxy

Our next target is a gravitationally disturbed spiral that interacted with nearby NGC 1808 in the recent past. A 4-inch telescope shows only a fat oval devoid of features. Through a 12-inch scope at magnifications above 200×, however, you'll see the galaxy's irregular shape and even illumination. To find this galaxy, look 2.5° south of magnitude 4.6 Gamma^1 (γ^1) Caeli.

OBJECT #929	Barnard 29
Constellation	Auriga
Right ascension	5h06m
Declination	31°44′
Magnitude	—
Size	10′ by 10′
Type	Dark nebula

To find our next target, look 2.4° southeast of magnitude Iota (ι) Aurigae. Here, you're not looking at the stars, rather the dark nebula Barnard 29, a cloud of obscuring material roughly 500 light-years away. It ranks among the most opaque nebulae in the sky, but it's not all that easy to see. Through a 12-inch telescope, B29 appears as a gray, mottled region nearly devoid of stars that blends gradually into its starry surroundings. The darkest area appears 15′ across. To the naked eye, the nebula forms part of a dark lane that runs from magnitude 2.7 Iota (ι) Aurigae to magnitude 1.7 Elnath (Beta [β] Tauri).

OBJECT #930	NGC 1808
Constellation	Columba
Right ascension	5h08m
Declination	–37°31′
Magnitude	9.9
Size	5.2′ by 2.3′
Type	Spiral (starburst) galaxy

NGC 1808 is easy to see and accepts high magnifications well because it has a high surface brightness. The galaxy's oval shape — twice as long as it is wide — is apparent, but you'll only see the initial stubs of the faint spiral arms that long-exposure images show stretching around NGC 1808's entire length.

Through a 16-inch or larger telescope, crank up the power, and try to see the dark lanes near the galaxy's outer edge. Astronomers recently discovered this galaxy has a high amount of star-formation occurring within it.

For those of you with the largest amateur scopes, three challenging galaxies lie roughly 10′ southeast of NGC 1808. The brightest, PGC 620467, glows weakly at magnitude 15.6. The other two, PGC 131395 and PGC 16804, are even fainter. Both of these galaxies have magnitudes of 15.9.

OBJECT #931	NGC 1817
Constellation	Taurus
Right ascension	5h12m
Declination	16°42′
Magnitude	7.7
Size	15′
Type	Open cluster

Our next object lies 7.5° southwest of magnitude 3.0 Zeta (ζ) Tauri. Don't confuse it with magnitude 7.0 NGC 1807, which measures 12′ across and lies 0.5° to the west-southwest. Through a 4-inch telescope, NGC 1817 displays three dozen stars. A striking chain of stars delineates the cluster's western edge. An 8-inch scope will let you count 100 stars. Although NGC 1807 is brighter than NGC 1817, it doesn't have nearly the appeal of the larger cluster.

OBJECT #932	NGC 1832
Constellation	Lepus
Right ascension	5h12m
Declination	−15°41′
Magnitude	11.3
Size	2.1′ by 1.5′
Type	Spiral galaxy

Our next target lies 0.5° north-northwest of magnitude 3.3 Mu (μ) Leporis. This fat spiral doesn't show much detail through telescopes smaller than about 16′. Through such a scope at a magnification above 250×, the thin, eastern arm appears better defined and seems detached from the galaxy.

OBJECT #933	NGC 1835
Constellation	Dorado
Right ascension	5h05m
Declination	−69°24′
Magnitude	10.1
Size	1.2′
Type	Globular cluster

Find the Large Magellanic Cloud, and look within the western part of its bar. NGC 1835 appears round, but high magnification shows faint extensions to the east and west that double its length. Two faint open clusters, magnitude 12.5 NGC 1828 and magnitude 12.6 NGC 1830, lie 6′ to the west.

Object #934 The Witch Head Nebula (IC 2118) Fred Calvert/Adam Block/NOAO/AURA/NSF

OBJECT #934	IC 2118
Constellation	Eridanus
Right ascension	5h07m
Declination	–7°13′

(continued)	
Size	180′ by 60′
Type	Emission nebula
Other name	The Witch Head Nebula

After midnight on Halloween, you can spot the Witch Head Nebula, also known as IC 2118, in the constellation Eridanus the River. This reflection nebula is similar to M78 in Orion. The Witch Head Nebula, however, is on a whole new scale: While M78 spans only 8′, IC 2118 stretches 1.5°.

Like M78 and other similar objects, the Witch Head Nebula glows by reflecting starlight. Well, astronomers have identified the star lighting up this cloud. It's Rigel (Beta [β] Orionis), the upraised left foot of Orion the Hunter.

You'll need to be under a dark sky to spot the Witch Head. Start your search a bit west of a point two-thirds of the way from brilliant Rigel to magnitude 2.8 Beta (β) Eridani. Through an 8-inch telescope, use an eyepiece that gives low power and a wide field of view. Through such an instrument you should see the brightest parts of the Witch's face.

If you're lucky enough to have a 16-inch or larger telescope, IC 2118 will be quite apparent, but you'll have to move the telescope to scan the Witch's features. The starting point (above) between Rigel and Beta Eridani marks the nebula's northern part.

OBJECT #935	NGC 1850
Constellation	Dorado
Right ascension	5h09m
Declination	–68°46′
Magnitude	9.0
Size	3.4′
Type	Open cluster
Other name	Caldwell 18

This massive open cluster lies in the northeastern part of the Large Magellanic Cloud's bar. A 6-inch telescope brings out roughly 50 stars glowing at magnitude 13 and 14 in a circular area. The prominent clump of stars on NGC 1850's western edge is a cluster designated NGC 1850A.

OBJECT #936	NGC 1851
Constellation	Columba
Right ascension	5h14m
Declination	–40°03′
Magnitude	7.2
Size	11′
Type	Globular cluster
Other name	Caldwell 73

Our next object is a nice one through small telescopes. NGC 1851 sits nearly 8° southwest of Phact (Alpha [α] Columbae), but you'll see it easily from a dark site through binoculars. This magnitude 7.0 globular is the brightest deep-sky object for more than 20° in any direction.

Through a 4-inch telescope, you'll see a concentrated core that you can't resolve surrounded by many stars you can. NGC 1851's core is difficult to resolve through large telescopes as well because of its distance. It lies 40,000 light-years from the Sun and 55,000 light-years from the Milky Way's center.

OBJECT #937	NGC 1857
Constellation	Auriga
Right ascension	5h20m
Declination	39°21′
Magnitude	7.0
Size	5′
Type	Open cluster

Our next target sits 0.8° south-southeast of magnitude 4.7 Lambda (λ) Aurigae. Through a 4-inch telescope, you'll see several dozen stars. The members of NGC 1857 shine mostly at 13th and 14th magnitude and the southern half of the cluster holds most of the bright stars. The one exception is SAO 57903, a magnitude 7.4 yellow star at the center.

OBJECT #938	NGC 1866
Constellation	Dorado
Right ascension	5h14m
Declination	–65°28′
Magnitude	9.7
Size	4.5′
Type	Open cluster

From magnitude 3.8 Beta (β) Doradus, sweep 3.7° south-southwest to reach NGC 1866. This cluster's brightest stars glow at 15th magnitude, so larger apertures can reveal hundreds of stars. At magnifications of 300× and higher, NGC 1866 appears stunning.

OBJECT #939	Beta (β) Orionis
Constellation	Orion
Right ascension	5h15m
Declination	–8°12′
Magnitudes	0.1/6.8
Separation	9″
Type	Double star
Other name	Rigel

A fine small telescope target is Rigel (Beta [β] Orionis). Rigel marks the brilliant left foot of Orion the Hunter. And it is, indeed, bright. Rigel is the 7th-brightest nighttime star, shining at magnitude 0.12. Its name comes from the Arabic *Rijl Jauzah al Yusra*, the Left Leg of the Jauzah. Regarding the term *Al Jauzah*, in *Star Names and Their Meanings*, Allen writes, "It is often translated Giant, but erroneously, for it, at first, had no personal signification. Originally it was the term used for a black sheep with a white spot on the middle of the body, and thus may have become the designation for the middle figure of the heavens, which from its preeminent brilliancy always has been a centre of attraction."

Point your telescope at Rigel, and insert an eyepiece that provides a magnification of about 100×. Just 9″ to Rigel's south, you'll spot Rigel B, more correctly called Beta (β) Orionis B. This magnitude 6.7 star is Rigel's companion. Although it's not all that faint, it can be tough to see if you don't use enough magnification. That's because Rigel A shines some 436 times more brightly than Rigel B.

When you do spot Rigel's companion, what color does it appear to you? Magnified through a telescope, Rigel appears white. To me, through my 4-inch refractor, Rigel B has a definite purple cast. Our color receptors vary widely, however, so the color you see could be different.

Object #940 The Flaming Star Nebula (IC 405) Adam Block/NOAO/AURA/NSF

OBJECT #940	IC 405
Constellation	Auriga
Right ascension	5h16m
Declination	34°16′
Size	30′ by 20′
Type	Emission nebula
Other names	The Flaming Star Nebula, Caldwell 31

The name Flaming Star Nebula is an exaggeration. This nebula appears as a dim wisp of light glowing in Auriga. To observe this object, first find the star AE Aurigae, which lies 4.2° east-northeast of magnitude 2.7 Iota (*ι*) Aurigae. The star's energy is what causes gas in the nebula to glow.

Most nebulae glow because a bright star or star cluster formed within their midst. Ultraviolet radiation from stars excites hydrogen atoms, causing them to glow. In the Flaming Star Nebula, the star AE Aurigae is the power source. But AE did not form there.

More than 2 million years ago, AE was a hot, young star within the Orion Nebula (M42). Gravitational interactions with nearby stars sent the star on a wild ride into space. By chance, we now see it passing through IC 405. As it does so, it illuminates part of the nebula.

German-born American astronomer John Martin Schaeberle (1853–1924) discovered the Flaming Star Nebula February 6, 1892. He found it on a photograph he took through a 6-inch refractor at Lick Observatory on Mt. Hamilton in California. German astronomer Maximilian Franz Joseph Cornelius Wolf (1863–1932) coined this object's common name in 1903.

Through a 6-inch telescope, the Flaming Star Nebula appears triangular in shape, with one point at the star AE Aur. Increase the telescope's aperture and add a Hydrogen-beta filter to both improve the nebula's contrast and dim AE Aur and other field stars.

OBJECT #941	Collinder 464
Constellation	Camelopardalis
Right ascension	5h22m

(continued)	
Declination	73°00′
Magnitude	4.2
Size	120′
Type	Open cluster

Collinder 464 (Cr 464) is a fine small telescope target in Camelopardalis. You'll spot it roughly 7° north-northeast of magnitude 4.3 Alpha Camelopardalis.

I hesitate to use that star as a guide because it's actually fainter than the magnitude 4 cluster. Unfortunately, Alpha Cam is the only reasonably bright nearby star. If you're into geometrical figures, Cr 464 makes an equilateral triangle with Alpha Cam and magnitude 4.6 Gamma Cam.

Cr 464 is a large cluster that spans 2°. The stars appear scattered, with the eastern and western sides sharply divided. The west section contains the brightest stars, with five brighter than magnitude 6.5. The five brightest stars in the east half range from magnitudes 6.2 to 7.3. Binoculars reveal the cluster, but I prefer a telescope with a magnification between 25× and 50× to really plumb Cr 464's depths.

OBJECT #942	IC 410
Constellation	Auriga
Right ascension	5h23m
Declination	33°31′
Size	40′ by 30′
Type	Emission nebula

This wonderful nebula sits 2.4° west-northwest of magnitude 4.7 Chi (χ) Aurigae. IC 410 responds well to a nebula filter, showing richly detailed structure even through small telescopes. The nebulosity glows brightest in a circular area some 5′ in diameter on the northwestern edge. Use a 12-inch scope with an OIII filter, and this object will knock your socks off.

OBJECT #943	NGC 1893
Constellation	Auriga
Right ascension	5h23m
Declination	33°24′
Magnitude	7.5
Size	12′
Type	Open cluster

Our last celestial target, IC 410, envelops the open star cluster NGC 1893. Ultraviolet radiation from those stars excite the gas in the nebula, causing it to glow. Through a 10-inch telescope at 100×, you'll see 50 stars irregularly strewn across the nebula's face.

OBJECT #944	The Large Magellanic Cloud
Constellation	Dorado
Right ascension	5h24m
Declination	–69°45′
Magnitude	0.4
Size	650′ by 550′
Type	Irregular galaxy
Common names	LMC; Nubecula Major

Southern Hemisphere observers definitely enjoy the sky's better half. Below the celestial equator lie the brightest stars, the center of our galaxy, the best dark nebulae, and the most brilliant celestial

wonder — the Large Magellanic Cloud (LMC). I talked about how the Magellanic Clouds got their name in the description for Object #776.

No less than 114 NGC objects lie within the LMC's boundaries. The finest, the Tarantula Nebula (NGC 2070) is itself one of the top 1,001 most spectacular celestial wonders.

If we lived on a planet within the LMC, the Milky Way would dominate the sky. Our galaxy would shine with a magnitude of –2 and would measure 36° long.

Under a dark sky, start observing the LMC without optical aid. Note the galaxy's brightest region, a luminous bar measuring roughly 5° by 1°. Outside the bar, the brightness drops rapidly, but you'll still detect an oval haze measuring 6° by 4°. To extend the LMC's boundary beyond this, use binoculars or a rich-field telescope and pan back and forth.

Through a 6-inch or larger telescope and a magnification around 200×, slowly scan back and forth across the LMC's face. Pause to examine the many star clusters and nebulae. A nebula filter will help you see the nebulae better but will worsen the view of clusters.

Object #945 M79 Adam Block/NOAO/AURA/NSF

OBJECT #945	M79 (NGC 1904)
Constellation	Lepus
Right ascension	5h24m
Declination	–24°31′
Magnitude	7.8
Size	8.7′
Type	Globular cluster

Globular cluster M79 lies in the small constellation Lepus the Hare. Lepus may be small, but it's easy to find. Just look directly south of Orion.

To spot M79, which, by the way, is the most southerly Messier object in the winter sky, use Alpha (α) and Beta (β) Leporis as pointers. Draw a line from magnitude 2.6 Alpha through magnitude 2.9 Beta and extend that line 3.5°, which is just slightly more than the distance between those two stars.

M79 is among the Milky Way's oldest globular clusters. Situated 60,000 light-years from the galactic center, this object lies 40,000 light-years from Earth. For all of its magnitude 7.8 brightness, M79 is a difficult object to resolve through small telescopes.

A 10-inch instrument shows that the 8.7′-wide globular has a bright, broadly concentrated core nearly devoid of stars. But crank up the magnification beyond 200×, and you'll resolve scores of stars as bright as 13th magnitude at the cluster's edges.

OBJECT #946	NGC 1907
Constellation	Auriga
Right ascension	5h28m
Declination	35°19′
Magnitude	8.2
Size	6′
Type	Open cluster

Our next target reveals two dozen stars through a 4-inch telescope at 100×. But use a low-power eyepiece, and you'll sweep up an even-brighter open cluster. NGC 1907 lies 0.5° south-southwest of open cluster M38.

OBJECT #947	118 Tauri
Constellation	Taurus
Right ascension	5h29m
Declination	25°09′
Magnitudes	5.8/6.6
Separation	4.8″
Type	Double star

This nice binary is easy to locate. It sits 3.5° south of magnitude 1.7 Elnath (Beta [β] Tauri). The primary is a bluish-white star, and the secondary glows with a more standard blue color.

Object #948 M38 Anthony Ayiomamitis

OBJECT #948	M38 (NGC 1912)
Constellation	Auriga
Right ascension	5h29m
Declination	35°50′
Magnitude	6.4
Size	21′
Type	Open cluster
Other name	The Starfish Cluster

Our next target is another of many great open star clusters in Auriga — M38. It's the westernmost of the three Messier clusters in this constellation.

Through a 4-inch telescope, you'll spot some three dozen stars in an area 20′ across. Although this region's background is rich, the cluster stands out well. Crank up the magnification, and you'll identify several nice chains of stars.

Just 0.5° south of M38 lies NGC 1907 (Object #946). Together, these clusters appear like a poor version of the Double Cluster in Perseus. NGC 1907 contains 25 stars, but a 4-inch will show about a dozen within a 4′ span.

This object's common name is the Starfish Cluster, although amateurs rarely use any descriptor other then M38. "Starfish" appears as part of a common name two other times in this book, for NGC 6544 (Object #521) and NGC 6752 (Object #582).

Object #949 NGC 1931 Al and Andy Ferayorni/Adam Block/NOAO/AURA/NSF

OBJECT #949	NGC 1931
Constellation	Auriga
Right ascension	5h31m
Declination	34°15′

(continued)	
Size	4′ by 4′
Type	Emission nebula with associated open cluster

Our next object sits 0.8° east-southeast of magnitude 5.1 Phi (*Φ*) Aurigae. NGC 1931 surrounds a tiny open cluster that contains only five bright stars. An 8-inch scope at 200× shows the nebula nicely. It orients from the northeast to the southwest and shows non-uniform brightness across its face.

OBJECT #950	Delta (δ) Orionis
Constellation	Orion
Right ascension	5h32m
Declination	–0°18′
Magnitudes	2.2/6.3
Separation	53″
Type	Double star
Other name	Mintaka

This is one of the sky's easiest double stars to find. Just locate Orion's belt. Mintaka is the northernmost of the three stars. The brighter component shines with a pure white light. Mintaka B, only 2% as bright as the primary, glows with a deep-blue color. This star's name descends to us from the Arabic *Al Mintakah*, which means "the Belt."

OBJECT #951	M1 (NGC 1952)
Constellation	Taurus
Right ascension	5h35m
Declination	22°01′
Magnitude	8.0
Size	6′ by 4′
Type	Supernova remnant
Other name	The Crab Nebula

One of the sky's most famous objects, and a nice small telescope target, is the Crab Nebula (M1) in Taurus. Although the word "nebula" is part of this object's name, astronomers classify M1 as a supernova remnant.

In 1054, a brilliant new star 4 times brighter than Venus appeared near Taurus the Bull's southern horn. For more than 3 weeks it remained visible during daylight hours, and it took more than a year to fade from view.

William Parsons, Third Earl of Rosse, sketched M1 in 1844 through his 72-inch reflecting telescope. Other astronomers noted the object's crablike appearance and gave M1 its common name.

This supernova remnant has a high surface brightness, so even a 3-inch telescope (and even some binoculars) will reveal it. The object shines at magnitude 8.0. The Crab Nebula has an oval shape. It measures 6′ by 4′ and orients northwest to southeast.

The easiest way to find the Crab Nebula is to start at the 4th-magnitude bluish star Zeta (ζ) Tauri. From there, move 1° to the northwest.

Object #952 M36 Anthony Ayiomamitis

OBJECT #952	M36 (NGC 1960)
Constellation	Auriga
Right ascension	5h36m
Declination	34°08′
Magnitude	6.0
Size	12′
Type	Open cluster
Other name	The Pinwheel Cluster

M36 is the least spectacular of the Messier trio of open clusters you'll find in Auriga. At magnitude 6.0, however, it still outshines 99% of the sky's star clusters. Through a 4-inch telescope, you'll see several dozen stars strewn across an area 10′ wide.

British amateur astronomer Jeff Bondono gave M36 its common name. Insert an eyepiece that gives a magnification around 100×, and see if you can spot a pinwheel-like pattern in this cluster's stars.

OBJECT #953	NGC 1962
Constellation	Dorado
Right ascension	5h26m
Declination	–68°50′
Type	Emission nebula
Notes	with NGCs 1965, 66, 70

Our next targets (four nebulae in a 5′-wide region) lie in the north central region of the Large Magellanic Cloud. Through an 8-inch telescope at low power, NGC 1962 appears circular and featureless. Use a magnification above 200×, and you'll see that the northern rim consists of three enhancements in an arced arrangement.

OBJECT #954	NGC 1964
Constellation	Lepus
Right ascension	5h33m
Declination	–21°57′
Magnitude	10.7
Size	5.0′ by 2.1′
Type	Barred spiral galaxy

Our next target lies 1.7° southeast of magnitude 2.8 Nihal (Beta [β] Leporis). Through a 12-inch telescope, you'll see only a haze surrounding a bright core. Less than 2′ northwest of NGC 1964 lies magnitude 10.2 SAO 170546.

OBJECT #955	IC 418
Constellation	Lepus
Right ascension	5h28m
Declination	–12°42′
Magnitude	9.3
Size	12″
Type	Planetary nebula
Common names	The Spirograph Nebula, the Raspberry Nebula, the Chameleon Nebula

This stunning deep-sky object is the Raspberry Nebula (IC 418) in Lepus. Now, it's not stunning because of its size or brightness. It's a small planetary, measuring only 12″ across, and it glows at magnitude 9.3. Much of this brightness comes from the magnitude 10.2 central star that sits within the nebulous disk.

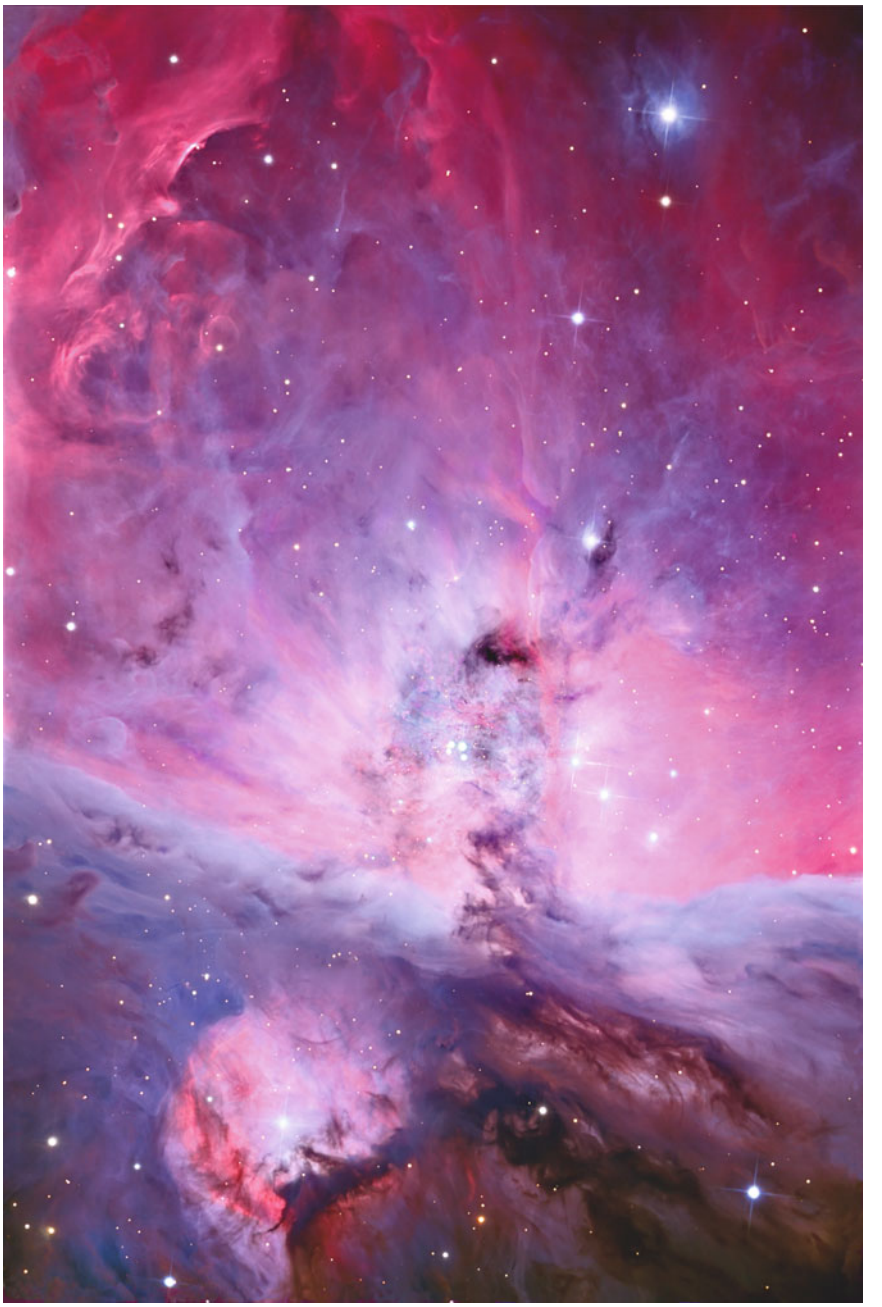
Amateur astronomers who viewed this object through large telescopes dubbed it the Raspberry Nebula because of the pale reddish color they saw. Don't expect to see this color through any telescope with an aperture smaller than about 12 inches. That being said, some observers have noted a faint red when they observed IC 418 at magnifications too low to reveal its disk. So, try decreasing the power, and look for the red.

Object #956 The Running Man Nebula (NGC 1973/5/7) Peter Spokes/Adam Block/NOAO/AURA/NSF

OBJECT #956	NGC 1973/5/7
Constellation	Orion
Right ascension	5h35m
Declination	–4°41′
Size	10′ by 5′
Type	Emission and reflection nebulae
Other name	The Running Man Nebula

In various places, you'll find the Running Man Nebula listed as NGC 1973, NGC 1975, or NGC 1977. In fact, it's all of them. Use a 10-inch or larger telescope, and you'll see an elongated bright nebula with an uneven texture. Two bright stars lie within the nebula: 42 Orionis is the brighter of the pair at magnitude 4.6, and 45 Orionis shines at magnitude 5.2.

Spend some time observing through an eyepiece whose field of view just contains this nebula. Can you see the shape that gives it the name "Running Man"? This feature is much easier to see on images, but under a dark sky you should be able to identify it. Here's a tip: Don't use a nebula filter because it will suppress all the reflection nebulosity that helps give the man his shape.



Object #957 The Orion Nebula (M42) Adam Block/Mount Lemmon SkyCenter/University of Arizona

OBJECT #957	M42 (NGC 1976)
Constellation	Orion
Right ascension	5h35m
Declination	–5°27′

(continued)	
Magnitude	4
Size	65′ by 60′
Type	Emission nebula
Other name	The Orion Nebula

This book lists the 1,001 most spectacular celestial wonders by visibility during the year. If we had ranked them according to popularity, however, the Orion Nebula easily would lay claim to the top spot.

Prior to the telescope's invention, celestial cartographers cataloged this region as a star. Bayer, in his *Uranometria*, assigned it the Greek letter Theta (θ). French patron Nicolas-Claude Fabri de Peiresc (1580–1637) first spotted the nebula in 1610.

Next to the Eta Carinae Nebula (Object #164), M42 is the sky's brightest diffuse nebula. Easily seen from a dark site, sharp-eyed observers can detect this cloudy patch even under moderate light pollution. Large telescopes show the full extent of this object, which covers an area 6 times the size of the Full Moon. Although you don't need a nebula filter, using one at a dark location accentuates the contrast between the light and dark regions.

Only 0.1° north-northeast of the Orion Nebula's center lies M43. It is often called De Mairan's Nebula in honor of its discoverer, French mathematician Jean-Jacques D'Ortous de Mairan (1678–1771). Note M43's sharp eastern edge, which is caused by a dark nebula overlapping that area.

OBJECT #958	Lambda (λ) Orionis
Constellation	Orion
Right ascension	5h35m
Declination	9°56′
Magnitudes	3.6/5.5
Separation	4.4″
Type	Double star
Other name	Meissa

This binary star that marks Orion's head has a blue star as the primary and a pale white companion. Start with a magnification around 100× to split this pair, and increase the power if necessary.

In *Star Names and Their Meanings*, Richard Hinckley Allen states that this star got its name because of an error by the lexicographer al-Firuzabadi (1326–1414), who compiled an extensive Arabic dictionary that served as the basis for subsequent European Arabic dictionaries. According to Allen, the Arabic title *Al Maisan* ("the proudly marching one") originally applied to Gamma (γ) Geminorum.

OBJECT #959	NGC 1981
Constellation	Orion
Right ascension	5h35m
Declination	−4°26′
Magnitude	4.2
Size	28′
Type	Open cluster
Other name	The Coal Car Cluster

Our next target is open cluster NGC 1981 in Orion. To locate this easy-to-see object, first find the Orion Nebula (M42). After you've soaked up the view from that celestial wonder, look 1° due north. You can think of NGC 1981 as the northernmost "star" in Orion's sword.

NGC 1981 is a bright open cluster. Its magnitude, 4.2, ties it for 11th place among open star clusters. It's large, too. NGC 1981's diameter is nearly that of the Full Moon.

When you observe NGC 1981 through a small telescope, use a magnification near 100×. Be sure to segregate the stars of the cluster from the surrounding star field. Note that the curved line of three magnitude 6.5 stars just to the east do not belong to the cluster.

That said, *Astronomy* magazine Contributing Editor Stephen James O'Meara combines those stars with others in NGC 1981 and draws an antique coal car, from which he extracts his common name for this cluster.

Object #960 The 13th Pearl Nebula (NGC 1999) Dan and Erica Simpson/Adam Block/NOAO/AURA/NSF

OBJECT #960	NGC 1999
Constellation	Orion
Right ascension	5h37m
Declination	–6°42′
Size	2′ by 2′
Type	Reflection nebula

You'll find NGC 1999 0.8° south-southeast of magnitude 3.0 Iota (*ι*) Orionis. This object's main feature is a dark obscuration near its center. Because of this void, you might initially think NGC 1999 is a ring-shaped planetary nebula. Crank up the power past 150×, and you'll see the dark, inner nebula's triangular form. Just outside the dark cloud sits V380 Orionis, a variable star that illuminates this nebula.

This nebula has a triangular shape, but there's more. A dark, irregular bar obscures much of the bluish light near NGC 1999's center. This dark cloud is a Bok globule, a region of dust and cold gas — possibly a star-forming region — that obscures the light from objects behind it.

Astronomers named such globules for Dutch-born American astronomer Bart Jan Bok (1906–1983), who pioneered their study. NGC 1999's illumination comes from the star V380 Orionis. It sits just outside and to the east-southeast of the dark central region. The star is so young that the reflection nebula NGC 1999 is material left over from the star's formation.

OBJECT #961	Sigma (σ) Orionis
Constellation	Orion
Right ascension	5h39m
Declination	–2°36′
Magnitudes	4.0/7.5/6.5
Separation	2.4″/58″
Type	Double star

Sigma Orionis isn't just a binary star, it's a nice multiple star system. Most lists mention the three brightest stars, but a fainter one lies nearby. Viewing the wide pair takes only low power. To split the two close bright stars and reveal the fainter fourth component will require you to boost the magnification past 150×. All four stars appear varying shades of white. You'll find Sigma easily with your naked eyes. It lies 0.8° southwest of magnitude 1.7 Alnitak (Zeta [ζ] Orionis).

OBJECT #962	NGC 2019
Constellation	Mensa
Right ascension	5h32m
Declination	–70°10′
Magnitude	10.9
Size	1′
Type	Globular cluster

Look toward the center of the Large Magellanic Cloud's bar for globular cluster NGC 2019. The reason you'll see this object is because of its small, bright core. Astronomers have found that NGC 2019 has a collapsed core, similar to several other globular clusters in the Magellanic Clouds.

Through an 8-inch telescope, you'll see the lumpy central region easily. Crank the magnification past 200×, and look for the irregular outer boundary. Double the aperture to 16 inches, and individual stars will appear.

OBJECT #963	NGC 2022
Constellation	Orion
Right ascension	5h42m
Declination	9°05′
Magnitude	11.9
Size	39″
Type	Planetary nebula

If your telescope lacks a go-to drive, you can still find NGC 2022 easily by using two bright stars. It lies two-thirds of the way from Betelgeuse (Alpha [α] Orionis) to Meissa (Lambda [λ] Orionis). Use at least an 8-inch telescope and high power (more than 250×) on this small planetary. If you can double the aperture to 16 inches, the planetary's outer region will appear slightly brighter, making NGC 2022 look ring-like. Also, through that size scope, you'll have no problem seeing the 15th-magnitude central star.

OBJECT #964	NGC 2024
Constellation	Orion
Right ascension	5h42m
Declination	–1°51′
Size	30′ by 30′
Type	Emission nebula
Common names	The Flame Nebula, the Tank Tracks, the Ghost of Alnitak

The Flame Nebula lies not quite 4° north-northeast of the Orion Nebula (M42). If you dial in this distance, however, you'll find yourself staring at magnitude 2.0 Alnitak (Zeta [ζ] Orionis), the southernmost star in Orion's Belt. The Flame Nebula sits only 15′ southeast of this luminary, so increase the magnification past 100× — make that 200× — and move Zeta out of the field of view. You can try using a nebula filter, but even it won't dim dazzling Zeta enough.

When you observe the Flame Nebula, remember that it covers the same area as the Full Moon. So, while its surface brightness is low, there's still lots of detail to be gleaned from this object, especially through telescopes with apertures greater than 10′. Look first for a dark lane that extends north-south, and then spend some time on each side of the lane trying to pull as much detail as you can out of the nebulosity.

In addition to the nebulosity, be sure to spend some time observing Alnitak, a fine triple-star. The two main components, separated by 2.6″, shine at magnitudes 1.9 and 3.4. A 4-inch telescope will separate them easily. The tertiary star, which glows at magnitude 9.5, sits 57″ northeast of the brightest component.

NGC 2024's main common name, the Flame Nebula, is easy to explain when you see it as part of any astronomical image. *Astronomy* magazine Contributing Editor Stephen James O'Meara gave it three other names, but the one I like best is the Ghost of Alnitak. Called that, it brings to mind a similar object, Mirach's Ghost (Object #784).

Famed Canadian astroimager Jack Newton dubbed this object the Tank Tracks Nebula. Through large telescopes, Newton had seen regular spacing in the nebulosity on either side of the dark lane.

OBJECT #965	M78 (NGC 2068)
Constellation	Orion
Right ascension	5h47m
Declination	0°03′
Size	8′ by 6′
Type	Reflection nebula

This small telescope target also is the sky's brightest reflection nebula: M78 in Orion. Through a 4-inch scope at about 120×, you'll spot an 11th-magnitude star. On either side of this star lie the two densest parts of M78.

If your site is dark, you'll see another, much fainter region of nebulosity, NGC 2067, only 4.5′ northwest of M78. A dark lane separates the two. Because so few background stars populate the field of view, astronomers believe M78 sits within a huge, dark cloud that eventually will form stars.

Oh, and don't use any nebular or deep-sky filter when you view M78. Because its light is mainly reflected starlight (composed of all frequencies) a filter will only dim the view.

OBJECT #966	NGC 2070
Constellation	Dorado
Right ascension	5h39m
Declination	–69°05′
Size	30′ by 20′
Type	Emission nebula
Other names	The Tarantula Nebula, 30 Doradus, the True Lovers' Knot, Caldwell 103

Most northern observers, unfortunately, haven't experienced the Tarantula Nebula. Although it lies in the Large Magellanic Cloud, this object looks incredible through medium-sized telescopes. With a true diameter of 1,000 light-years, NGC 2070 would span 20° if it were as close as the Orion Nebula (M42), within the Milky Way.

English astronomer John Flamsteed (1646–1719) cataloged NGC 2070 as the star 30 Doradus. French astronomer Nicolas Louis de Lacaille (1713–1762) first recognized it as a nebula December 5, 1751.

The brightest star cluster in the Tarantula Nebula, and the most remarkable star-forming region anywhere, is R136. Many of its 60 stars are among the most massive, brightest, and hottest stars known.

Even through a 4-inch telescope, NGC 2070 shows loops and filaments. A dense central bar runs north to south. R136 is easy to spot as a 1′-wide region of several dozen bright stars. The longest filament begins near the cluster's center and extends 7′ to the south. It then extends eastward and loops an equal distance to the north.

Two well-defined dark bays, one slightly darker than the other, lie east of R136. The appearance of nebulous "ropes" encircling darker regions led English astronomer William Henry Smyth to describe this nebula as the True Lover's Knot. According to some accounts, sixteenth-century Dutch sailors tied similar knots to remind them of lovers they'd left behind.

OBJECT #967	Zeta (ζ) Orionis
Constellation	Orion
Right ascension	5h41m
Declination	–1°57′
Magnitudes	1.9/4.0/9.9
Separation	2.4″, 58″
Type	Double star
Other name	Alnitak

Like Mintaka (Delta [δ] Orionis), you'll find Alnitak in Orion's belt. Alnitak is the easternmost and southernmost of the three bright stars. Zeta Orionis is a triple star system, but if you think it's a double, I understand. The bright light-blue A component has a nearby 4th-magnitude companion, which also is blue. A 3-inch telescope will split this pair if your magnification exceeds 150×. Larger scopes will show the 10th-magnitude tertiary star — also blue — nearly 1′ away.

The name Alnitak comes from the Arabic *Al Nitak*. It means "the girdle."

Object #968 The Horsehead Nebula (B33) Adam Block/Mount Lemmon SkyCenter/University of Arizona

OBJECT #968	Barnard 33
Constellation	Orion
Right ascension	5h41m
Declination	–2°28′
Size	6′ by 4′
Type	Dark nebula
Other name	The Horsehead Nebula

If you can see the Flame Nebula (Object #964) easily, try for the wonder many observers consider the ultimate challenge object — the Horsehead Nebula. This dark protrusion sits in front of emission nebula IC 434. Only 15′ to its northeast lies NGC 2023, a 10′-wide dot of bright nebulosity.

Although some observers have viewed the dark protrusion through telescopes as small as 5′ in aperture, a 12-inch or larger scope will bring out the horsehead shape. A standard nebula or deep-sky filter will help, but to make this wonder really pop, use a Hydrogen-beta filter.

OBJECT #969	NGC 2090
Constellation	Columba
Right ascension	5h47m
Declination	–34°15′
Magnitude	11.0
Size	4.5′ by 2.3′
Type	Spiral galaxy

From magnitude 2.7 Phact (Alpha [α] Columbae), pan 1.5° east to our next target. Through any telescope, NGC 2090 appears lens shaped and oriented north-south. The core is broad and evenly illuminated. You'll need a 12-inch scope to see the thin, diffuse halo.

Object #970 The Salt-and-Pepper Cluster (M37) Anthony Ayiomamitis

OBJECT #970	M37 (NGC 2099)
Constellation	Auriga
Right ascension	5h52m
Declination	32°33′
Magnitude	5.6
Size	20′
Type	Open cluster
Other name	The Salt and Pepper Cluster

Want to make a model of a celestial object at home? Lay a piece of black paper on a table, and sprinkle a quarter teaspoon of salt on it. Then shine a bright light on the crystals. Voila! M37. Well, not exactly, but you get the idea.

Hodierna discovered this star cluster prior to 1654. Messier independently discovered it in 1764. Admiral Smyth probably described it best when he wrote, "A magnificent object; the whole field being strewd, as it were, with sparkling gold dust and the group is resolvable into about 500 stars from 10–14 mag. besides outliers."

Through any size telescope, M37 displays an even distribution of stars not found in many other clusters. Although it sits squarely within Milky Way, M37's edge is easy to discern.

A 3-inch scope reveals 50 stars. The brightest member — a magnitude 9 orange star — sits near the cluster's center.

With many open clusters, increasing the size of the telescope worsens the view; as the cluster gets magnified, the stars thin. Also, larger scopes reveal more background stars, making it harder to see the cluster's outline.

Not with M37. With this wonder, larger scopes only reveal more stars. Through a 10-inch scope, you'll count 200 stars, and a 16-inch will reveal 500.

OBJECT #971	NGC 2100
Constellation	Dorado
Right ascension	5h42m
Declination	–69°14′
Magnitude	9.6
Size	2.8′
Type	Open cluster

Our next target lies 0.3° east-southeast of the Tarantula Nebula (NGC 2070). Through an 8-inch telescope, you'll see two dozen stars around the outskirts of this cluster. It has a compact core that requires high magnification to resolve.

OBJECT #972	Sh 2–276
Constellation	Orion
Right ascension	5h48m
Declination	1°00′
Size	600′ by 30′
Type	Emission nebula
Other name	Barnard's Loop

Because Barnard's Loop is so huge — it spans some 20° and covers much of Orion — you'll need a telescope/eyepiece combination that yields a wide field. The nebula's brightest part stretches 6° and tapers at the northwestern end. Head to a dark site, and take your time when you search for Barnard's Loop. You'll be moving your scope around a lot, but try to keep the movements slow ones. Even with a nebula filter in place, you'll see just a slight diffuse brightening in that part of the sky.

OBJECT #973	NGC 2112
Constellation	Orion
Right ascension	5h54m
Declination	0°24′
Magnitude	8.4
Size	11′
Type	Open cluster

This small telescope target is open cluster NGC 2112 in Orion. This object, which lies 2,800 light-years away, glows at magnitude 9.0.

To find NGC 2112, move 4° northeast from Zeta (ζ) Orionis, the bottom star in Orion's belt. A 4-inch telescope at 100× reveals two dozen faint stars strewn across an area 8′ in diameter. Although the cluster appears loose, a strong background glow hints at the presence of dozens of unresolved stars. For those, however, you'll need a larger scope.

OBJECT #974	NGC 2126
Constellation	Auriga
Right ascension	6h03m
Declination	49°54′
Magnitude	10.2
Size	6′
Type	Open cluster

Our next target lies midway between magnitude 1.9 Menkalinan (Beta [β] Aurigae) and magnitude 3.7 Delta (δ) Aurigae. Through a 6-inch telescope, you'll see about 20 stars. The magnitude 6.0 star SAO 40801 lies 3′northeast.

OBJECT #975	NGC 2129
Constellation	Gemini
Right ascension	6h02m
Declination	23°19′
Magnitude	6.7
Size	6′
Type	Open cluster

Our next object lies less than 0.5° from the intersection of the borders of Taurus, Orion, and Gemini. To find it, look 3.3° west-northwest of magnitude 3.3 Propus (Eta [η] Geminorum).

A 4-inch telescope will show you two dozen stars. The brightest, SAO 77842, shines at magnitude 7.4.

OBJECT #976	Epsilon (ε) Monocerotis
Constellation	Monoceros
Right ascension	6h24m
Declination	4°36′
Magnitudes	4.5/6.5
Separation	13.4″
Type	Double star

Our next target is a nice bright binary that's an easy split through any telescope. To find it, star-hop from Betelgeuse (Alpha [α] Orionis). Just look 7.6° east-southeast of that brilliant star.

OBJECT #977	NGC 2141
Constellation	Orion
Right ascension	6h03m
Declination	10°26′
Magnitude	9.4
Size	10′
Type	Open cluster

This open cluster lies 0.8° north of magnitude 4.1 Mu (μ) Orionis. Although this star cluster contains many stars, they're all faint and closely packed, so you'll need an 8-inch telescope to resolve them. At 200×, the stars appear evenly distributed across NGC 2141's face. A nice background of fainter stars hovers near the limit of vision. Want to see them? Move up to a 12-inch or larger scope.

Object #978 The Dusty Hand Galaxy (NGC 2146) Adam Block/NOAO/AURA/NSF

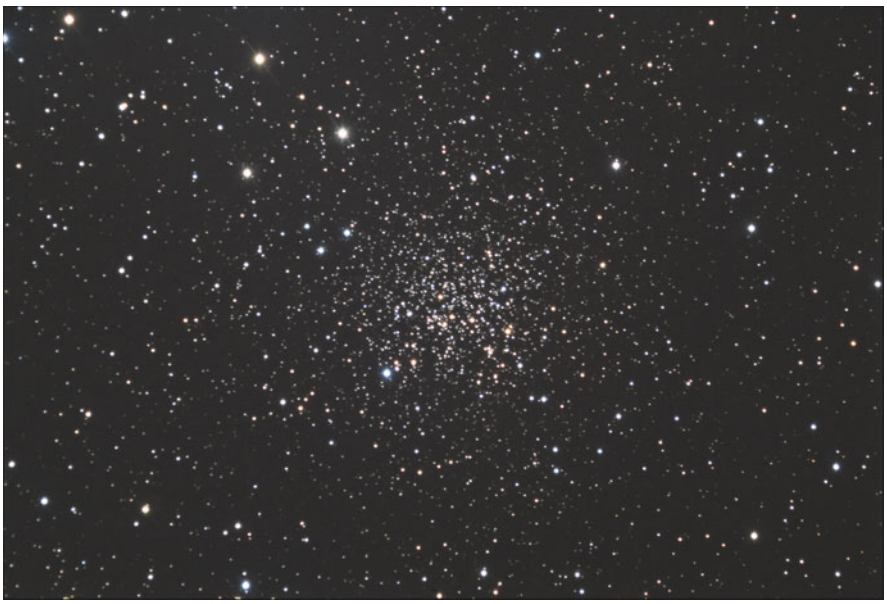
OBJECT #978	NGC 2146
Constellation	Camelopardalis
Right ascension	6h19m
Declination	78°21′
Magnitude	10.6
Size	5.4′ by 4.5′
Type	Barred spiral galaxy
Other name	The Dusty Hand Galaxy

Our next target is a spiral galaxy undergoing a major burst of star formation. Finding it without a go-to drive isn't easy because of the lack of bright stars in the area. Look 11.6° northeast of magnitude 4.6 Gamma (γ) Camelopardalis. NGC 2146 displays a broad central region. Telescopes with apertures larger than 10 inches show some mottling close to the core and a dark, subtle lane near the southwestern edge.

The Dusty Hand Galaxy got its common name from images that showed a system of three dust lanes, which may be spiral arms. Astronomers have found clear indications of starburst activity, such as a strong galactic wind. In most cases where other galaxies have displayed strong star-forming activity, a companion is responsible, usually seen merging with the main galaxy. Although NGC 2146 shows no obvious signs of a merger, that scenario seems to be the most plausible explanation. Probably the encounter happened long ago that no traces are left.

OBJECT #979	Theta (θ) Aurigae
Constellation	Auriga
Right ascension	6h00m
Declination	37°13′
Magnitude range	2.6/7.1
Separation	3.6″
Type	Double star

The components of this relatively close binary exhibit a marked difference in brightness. The primary outshines the secondary by 63 times. The brighter star appears white with perhaps a tinge of blue. The secondary appears light-orange.



Object #980 M35 Anthony Ayiomamitis; NGC 2158 Adam Block/Mount Lemmon SkyCenter/University of Arizona

OBJECT #980	M35 (NGC 2168)
Constellation	Gemini
Right ascension	6h09m
Declination	24°20′
Magnitude	5.1
Size	28′
Type	Open cluster

It's hard to resist a two-for-one sale, and that's exactly what our next wonder offers. M35 lies 2.3° northwest of magnitude 3.3 Eta (η) Geminorum. From a dark site, you'll spot the cluster easily without optical aid. Point a telescope at M35, however, and not only will it explode into stars, you'll see a second open cluster, magnitude 8.6 NGC 2158.

Philippe Loys de Chéseaux discovered this cluster in late 1745 or early 1746. English astronomer John Bevis also found it before 1750, the year he featured it in his star atlas, *Uranographia Britannica*. Messier, who added it to his catalog August 30, 1764, credited Bevis for the discovery.

M35 contains two dozen stars brighter than 9th magnitude, most of which reside near the cluster's center. In this region, look for a string of stars some 10′ long shaped like a saxophone. The stars align in many other patterns; some of the arcs extend nearly 1°. Fainter members push the total number of visible stars past 200.

If you use a low-power eyepiece to engulf M35, NGC 2158 will look like a small, fuzzy ball. This cluster rewards high magnification. Through a 14-inch telescope at 500×, you'll count 30 stars. Increase the aperture to 20 inches, however, and you'll double that number.

OBJECT #981	NGC 2169
Constellation	Orion
Right ascension	6h08m
Declination	13°58′
Magnitude	5.9
Size	6′
Type	Open cluster
Other name	"37" Cluster

To find our next target, first locate magnitude 4.5 Xi (ξ) and magnitude 4.4 Nu (ν) Orionis. NGC 2169 forms the top of an isosceles triangle roughly 0.8° from each star. Well, sort of. Actually, the cluster lies to the south of the stellar pair. From a dark site, sharp-eyed observers will spot NGC 2169 with their naked eyes.

The cluster isn't huge — it spans only 6′ — but it contains seven stars brighter than 9th magnitude. Use an eyepiece that gives a 1° field of view and enjoy the wide view of NGC 2169 against the Milky Way's myriad background stars.

Oh, I almost forgot. The common name the "37" Cluster comes from imaginative observers viewing this cluster at low power and seeing the number 37 in it. (Some see the letters "LE.") To do this, you need a view that puts north up and east to the left. Also, a telescope/eyepiece combination that yields a field of view of about one-quarter degree seems to work best.

Object #982 NGC 2170 Doc. G. and Dick Goddard/Adam Block/NOAO/AURA/NSF

OBJECT #982	NGC 2170
Constellation	Monoceros
Right ascension	6h08m
Declination	–6°24′
Size	2′ by 2′
Type	Reflection nebula

Our next object lies 1.8° west of magnitude 4.0 Gamma (γ) Monocerotis and sits within a group of reflection nebulae. Through an 8-inch telescope, you'll see a bright circular haze that surrounds a magnitude 9.5 star. Only 0.5° east lies reflection nebula NGC 2182. It appears fainter than NGC 2170, measures 1′ across, and surrounds a magnitude 9.3 star.

OBJECT #983	NGC 2175
Constellation	Orion
Right ascension	6h10m
Declination	20°30′
Size	40′ by 30′
Type	Emission nebula
Other name	The Monkey Face Nebula

Our next celestial target combines an emission nebula with an open star cluster. Astronomers divide the two into NGC 2174 and NGC 2175, but you'll most often see it referred to as NGC 2175. You'll spot it easily 2.2° southwest of magnitude 3.3 (Eta [η] Geminorum).

This nebula is a roughly circular object with an indentation on its western side, and it lies in a rich star field. A 4-inch telescope will reveal NGC 2175, but you'll need a 16-inch or larger telescope to see the full extent of the nebulosity. That size instrument will begin to show you the shape that gives NGC

2175 its common name. The 7th-magnitude star you'll spot at the nebula's center is a chance alignment. It lies much closer than NGC 2174. Use a nebula filter such as an OIII to reduce the star's glare and improve the nebula's contrast.

Object #984 NGC 2182 Adam Block/NOAO/AURA/NSF

OBJECT #984	NGC 2182
Constellation	Monoceros
Right ascension	6h10m
Declination	–6°20′
Size	2.5′ by 2.5′
Type	Reflection nebula

You'll find our next target 1.3° west of magnitude 4.0 Gamma (γ) Monocerotis. The magnitude 9.3 star GSC 4795:1776 appears to be involved with the nebulosity. Look 20′ to the east-northeast for another reflection nebula, NGC 2183.

OBJECT #985	NGC 2186
Constellation	Orion
Right ascension	6h12m
Declination	5°28′
Magnitude	8.7
Size	5′
Type	Open cluster

This nice cluster displays some two dozen stars through an 8-inch telescope at 100×. A pair of stars, magnitudes 9.3 and 9.8, sit at NGC 2186's center. You'll find this object 4.6° east-southeast of magnitude 0.5 Betelgeuse (Alpha [α] Orionis).

OBJECT #986	NGC 2188
Constellation	Columba
Right ascension	6h10m
Declination	–34°06′
Magnitude	11.6
Size	5.5′ by 0.8′
Type	Barred spiral galaxy

Our next object has a disk that inclines only 3° from edge-on. It appears moderately bright through an 8-inch telescope, five times as long as it is wide, and roughly oriented north-south. NGC 2188 shows an even brightness distribution. A 16-inch scope will let you see the truncated southern edge.

Object #987 NGC 2194 Doug Matthews/Adam Block/NOAO/AURA/NSF

OBJECT #987	NGC 2194
Constellation	Orion
Right ascension	6h14m
Declination	12°48′
Magnitude	8.5
Size	8′
Type	Open cluster

Our next object lies near Orion's uplifted arm 1.5° south-southeast of magnitude 4.5 Xi (ξ) Orionis. This reasonably bright open cluster is an appealing small-telescope target. At 150×, you'll spot several dozen stars between 10th and 13th magnitude spread over an area 6′ across. Look for a concentration of 11th-magnitude stars at the cluster's heart.

OBJECT #988	NGC 2204
Constellation	Canis Major
Right ascension	6h16m
Declination	–18°40′
Magnitude	8.6
Size	10′
Type	Open cluster

Our next target sits 1.8° west-southwest of magnitude 2.0 Mirzam (Beta [β] Canis Majoris). Through an 8-inch telescope, you'll see three dozen stars, the brightest of which sits on the northwestern edge. That's the magnitude 8.8 star SAO 151278. Just 12′ to the north-northwest sits magnitude 6.0 SAO 151274.

OBJECT #989	NGC 2207
Constellation	Canis Major
Right ascension	6h16m
Declination	–21°22′
Magnitude	10.8
Size	4.8′ by 2.3′
Type	Spiral galaxy

From magnitude 2.0 Mirzam (Beta [β] Canis Majoris), pan 4° south-southwest to NGC 2207, a spiral galaxy interacting with its neighbor, the magnitude 11.7 spiral IC 2163. Through a 10-inch telescope, NGC 2207 shows a bright core surrounded by a thin halo. The galaxy orients east-west. IC 2163 lies 1′ east and shows a broadly concentrated glow 2′ across.

OBJECT #990	NGC 2214
Constellation	Dorado
Right ascension	6h13m
Declination	–68°16′
Magnitude	10.9
Size	3.6′
Type	Open cluster

This small cluster lies 4.5° east-northeast of the Large Magellanic Cloud. For a better marker, look 0.7° north-northeast of magnitude 5.1 Nu (ν) Doradus. Through a 4-inch telescope, NGC 2214 appears as a bright haze. Even through a 12-inch scope, the cluster's stars are hard to resolve except at the edge.

OBJECT #991	9–12 Geminorum Cluster
Constellation	Gemini
Right ascension	6h18m
Declination	23°38′
Type	Asterism

A nice small telescope target is the unusually named 9–12 (pronounced "9 through 12") Geminorum Cluster. The name has nothing to do with any date. Rather, it refers to numbers given to four stars by the first British Astronomer Royal, John Flamsteed (1646–1719). During his surveys of the constellations, Flamsteed assigned numbers to the stars in each constellation by increasing right ascension. His entire list contains 2,554 stars.

Although most astronomers no longer refer to the majority of stars by their Flamsteed numbers, a few famous exceptions exist: 61 Cygni was one of the first stars to have its proper motion determined;

51 Pegasi, in 1995, became the first Sun-like star found to have a planet orbiting it; and 47 Tucanae, also known as NGC 104, is the sky's second-brightest globular cluster.

So, the four stars in the 9–12 Geminorum Cluster are 9, 10, 11, and 12 Geminorum. Their magnitudes are 6.3, 6.6, 6.9, and 7.0, respectively. This small cluster, which has a total listed magnitude of 5.7, also carries the designation Collinder 89. It lies about 1.5° northwest of magnitude 2.9 Mu (μ) Geminorum. The 9–12 Geminorum Cluster measures 1° across and makes a nice binocular target.

OBJECT #992	NGC 2215
Constellation	Monoceros
Right ascension	6h21m
Declination	–7°17′
Magnitude	8.4
Size	10′
Type	Open cluster

Our next target lies 2° west of magnitude 4.7 Beta (β) Monocerotis. Through a 6-inch telescope, you'll see 25 stars. The even distribution and similar magnitudes leads the eye to pattern forming. Do you see a curved letter M?

OBJECT #993	NGC 2217
Constellation	Canis Major
Right ascension	6h22m
Declination	–27°14′
Magnitude	10.2
Size	5.0′ by 4.5′
Type	Spiral galaxy

This object lies 3° north of magnitude 3.0 Zeta (ζ) Canis Majoris. A 12-inch telescope at 250× shows a short bar elongated east-west. The galaxy has an even brightness distribution across its central region. To the north and south you may see the faint halo.

OBJECT #994	NGC 2232
Constellation	Monoceros
Right ascension	6h27m
Declination	–4°45′
Magnitude	3.9
Size	29′
Type	Open cluster

You'll see this cluster with your naked eyes from any dark site. The blue-white central star is magnitude 10 Monocerotis, which shines at magnitude 5.1. A 6-inch telescope at 100× shows the cluster as a group of a dozen stars elongated north-south. Through a 12-inch scope, dozens more faint stars pop into view.

OBJECT #995	Beta (β) Monocerotis
Constellation	Monoceros
Right ascension	6h29m
Declination	–7°02′
Magnitudes	4.7/5.2
Separation	7.3″
Type	Double star

Beta Monocerotis is a star you won't tire of observing. It's a close triple star whose magnitudes are 4.7, 5.2, and 6.1. Astronomers refer to them as the A, B, and C components, respectively. The separations are A-B = 7″; B-C = 3″; A-C = 10″. All three stars appear white.

Object #996 NGC 2236 Mark and Patricia Wessels/Adam Block/NOAO/AURA/NSF

OBJECT #996	NGC 2236
Constellation	Monoceros
Right ascension	6h30m
Declination	6°50′
Magnitude	8.5
Size	6′
Type	Open cluster

Our next target lies 2.7° north-northeast of magnitude 4.5 Epsilon (ε) Monocerotis. Through a 6-inch telescope, you'll see an unevenly distributed group of two dozen stars. Those faint points surround a 9th-magnitude luminary that lies at NGC 2236's heart.

Object #997 The Rosette Nebula (NGC 2237–9) Adam Block/NOAO/AURA/NSF

OBJECT #997	NGC 2237–9
Constellation	Monoceros
Right ascension	6h32m
Declination	5°03′
Size	80′ by 60′
Type	Emission nebula
Other names	The Rosette Nebula, Caldwell 49

Most observers recognize the magnificent Rosette Nebula as a single deep-sky wonder. But this object wasn't found all at once.

Sir William Herschel discovered open cluster NGC 2244 in 1784. This naked-eye star cluster lies at the heart of the Rosette Nebula. In 1864, German astronomer Albert Marth (1828–1897) discovered NGC 2238. To complete the picture, American astronomer Lewis Swift (1820–1913) discovered NGC 2237 in 1883 and NGC 2246 in 1886.

From a dark site, you'll first spot NGC 2244. A 4-inch telescope will reveal two dozen stars in an oval region elongated northwest to southeast; a half dozen of these surpass 8th magnitude. Larger scopes reveal countless fainter background stars.

To best observe the Rosette Nebula, use a magnification of 50× and insert a nebula filter to dim NGC 2244's stars. The nebula's western side appears brighter. Here, the ring's inner wall appears straight with a tiny bit of scalloping; the outer wall looks thin with an extension to the northwest.

The Rosette's eastern side is much wider. A nebulous wall with a well-defined border forms its northern edge. Although the Rosette is an emission nebula, your eye will also notice the many small dark nebulae superimposed on the bright background.

OBJECT #998	NGC 2243
Constellation	Canis Major
Right ascension	6h30m
Declination	–31°17′
Magnitude	9.4
Size	13′
Type	Open cluster

This faint cluster lies 2.3° east-southeast of magnitude 3.0 Furud (Zeta [ζ] Canis Majoris). An 8-inch telescope reveals a dozen or so faint stars against a hazy glow. A 16-inch scope reveals 30 stars, but resolving them is still a problem.

OBJECT #999	NGC 2244
Constellation	Monoceros
Right ascension	6h32m
Declination	4°52′
Magnitude	4.8
Size	23′
Type	Open cluster
Other name	Caldwell 50

Our next object is the open cluster associated with the Rosette Nebula (NGC 2237–9). You'll spot it easily with your naked eye from a dark observing site. Through a 6-inch telescope, you'll see two dozen bright stars and some 100 fainter ones. A half dozen of the bright stars shine at magnitude 8 or brighter. The cluster's main portion appears oval and oriented northwest to southeast.

OBJECT #1000	NGC 2251
Constellation	Monoceros
Right ascension	6h35m
Declination	8°22′
Magnitude	7.3
Size	10′
Type	Open cluster

Our 1,000th object lies 9.8° east of magnitude 0.5 Betelgeuse (Alpha [α] Orionis). This bright cluster looks nice even through a 4-inch telescope. At 100×, you'll see two dozen stars randomly distributed and of unequal brightnesses. Move up to an 8-inch scope, and the star count will rise to 50.

Object #1001 Hubble's Variable Nebula (NGC 2261) Carole Westphal/Adam Block/NOAO/AURA/NSF

OBJECT #1001	NGC 2261
Constellation	Monoceros
Right ascension	6h39m
Declination	8°44′
Size	3.5′ by 1.5′
Type	Emission and reflection nebulae
Other names	Hubble's Variable Nebula, Caldwell 46

All too soon we've come to the end of our list. It's nice to end with a bang, and although you can spot NGC 2261 through a 3-inch telescope, you'll need at least a 12-inch scope at 250× to give this object some pop.

Hubble's Variable Nebula is a fascinating reflection nebula associated with the variable star R Monocerotis. NGC 2261 appears triangular, almost comet-like, with the comet's "head" pointing southward. The nebula's brightness appears even across its face and, except for the northern side, all edges look sharp.

Why is the nebula variable? A recent theory states that dense knots of opaque dust pass close to R Monocerotis. As they do, they cast slowly moving shadows that fall on the dust in the nebula that reflects most of the light.

William Herschel discovered Hubble's Variable Nebula in 1783. The nebula's common name comes from American astronomer Edwin Hubble (1889–1953), who studied it extensively starting in 1916 at Yerkes Observatory in Wisconsin.

And here's an additional bit of trivia for you: According to the California Institute of Technology, Hubble's Variable Nebula was the first object photographed by the 200-inch Hale Telescope at Palomar Observatory. Hubble sat in the prime focus cage of that instrument and recorded an image of it January 26, 1949.