

DEEP-SKY OBSERVING

Venture off the beaten path to observe twelve extragalactic gems Messier missed. **/// BY STEVE GOTTLIEB**

Explore a dozen must-see galaxies

Spice up your observing sessions by taking a tour of a dozen often overlooked springtime galaxies. These objects are just as impressive at the eyepiece as those with a Messier designation. Galaxies appear washed out in light-polluted skies, so head out to a dark site for the best

views — you won't be disappointed with what you see through your telescope.

Let's begin with the **Hotspot Galaxy** (NGC 2903), one of the brightest galaxies missed by French comet-hunter Charles Messier (1730–1817). To locate this barred spiral in the constellation Leo, point your scope at 4th-magnitude Alterf (λ Leonis) and then drop 1.5° south. In 2001, the Hubble Space Telescope resolved infrared hot spots in the galaxy's central region into sites of intense star formation. Because of these hot spots, astronomers classify NGC 2903 as an active starburst galaxy.



CHRIS SCHUR

1 THE HOTSPOT GALAXY (NGC 2903) is so named because its central region contains areas of intense star formation. Dust and HII knots cause this barred spiral's oval disk to appear splotchy. The Hotspot lies in the constellation Leo.

From a dark site, my 9x50 finder scope reveals a soft, elongated glow. An 8-inch scope provides an impressive view of NGC 2903, showing a bright, mottled core encased in a large oval disk.

Through my 18-inch Starmaster, the galaxy stretches across a 10' by 4' area of sky. The disk appears splotchy due to dust and HII knots, which are regions of ionized hydrogen. Two of these faint knots are symmetrically placed northeast and southwest of the core, respectively. In the 1850s, observers using Irish astronomer Lord Rosse's (1800–1867) 72-inch reflector (called the Leviathan of Parsonstown) first



2 THE SPINDLE GALAXY (NGC 3115) harbors a 2-billion-solar-mass black hole at its center. We see the Spindle edge-on. This star-poor galaxy is long and has tapered ends, giving NGC 3115 its lens-like appearance. **CHRIS SCHUR**



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3 SPIRAL GALAXY NGC 3521 lies 35 million light-years away in Leo. This galaxy's bright oval core is surrounded by knotty spiral arms dotted with stars. A dark dust lane cuts across NGC 3521's western edge.

described these regions as “two subordinate nuclei on either side of center.”

Our next target is the **Spindle Galaxy** (NGC 3115). This 9th-magnitude lenticular galaxy (it has a lens-like appearance when seen edge-on) resides in the star-poor constellation Sextans roughly 30 million light-years away. Astronomers using the Canada-France-Hawaii Telescope and Hubble measured the rotational velocity of stars near this galaxy's center and discovered the existence of a 2-billion-solar-mass black hole in NGC 3115's core.

It's surprising this galaxy escaped Messier. Even the smallest scope reveals an elongated glow tilted southwest to northeast and brightening in the center. A 6-inch scope displays this edge-on galaxy's high surface brightness and narrowing tips. Through my 18-inch scope, NGC 3115's intensely glowing core harbors a striking, nearly stellar, nucleus with tapered extensions that stretch 5.5' by 1.3'.

Steve Gottlieb gave readers tips for observing exploded stars in the September 2006 issue. He observes under the skies of northern California.



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4 THE SILVER NEEDLE GALAXY (NGC 4244) takes its name from its long, slender, needle-like appearance.

Located some 8 million light-years distant in the constellation Canes Venatici, the Silver Needle appears edge-on and spans 16'.

Next, let's head over to the constellation Leo and spiral galaxy **NGC 3521**. This 9th-magnitude galaxy straddles the celestial equator in southeastern Leo. Unfortunately, this galaxy often is bypassed in favor of splashier M65 and M66 to the north. Next time you're in this region, take a look at NGC 3521. Images reveal multiple knotty spiral arms and dust lanes that tightly wind down to a blazing core.

An 8-inch scope shows a bright, 5' by 2' oval sporting a concentrated core and a fainter halo tipped north-northwest to south-southeast. The view is impressive in my 18-inch scope at 225x — the region surrounding the small, elongated core is mottled, with hints of spiral structure, while the core brightens to a star-like nucleus. A dust lane is evident along the galaxy's west side. A dim outer portion of the disk extends beyond this dust lane.

Canes Venatici is home to the **Silver Needle Galaxy** (NGC 4244) as well as a splendid collection of four splashy Messier galaxies (M51, M63, M94, and M106). To star-hop to the Silver Needle, begin at 4th-magnitude Chara (Beta [β] Canum Venaticorum), and then slide 2.8° southwest to 5th-magnitude 6 Canum Venaticorum. Continue another 2° southwest to arrive at NGC 4244.

In a 4-inch or 6-inch scope, this ghostly sliver stretches 10' to 12' in length. Through my 18-inch scope, the Silver Needle pierces 16' by 1.5' of sky and slopes southwest to northeast. The galaxy brightens toward the center and tapers at the tips. NGC 4244's surface brightness is low, but it exhibits a

grainy texture. Because this galaxy lies only 8 million light-years away, a large amateur scope reveals unresolved clumps of dust and its luminous star clouds.

NGC 4485 and NGC 4490 form a remarkable pair of interacting galaxies known collectively as the **Cocoon Galaxy**. Find the pair 40' northwest of Chara. Separated by 25,000 light-years, this duo now is rushing apart from an earlier encounter that disrupted the galaxies and pulled out a bridge of gas and stars linking NGC 4485 to NGC 4490's western arm.

An 8-inch scope easily shows NGC 4490 as an irregular 5' by 2.5' oval enclosing a bright, grainy core. Its fainter companion, NGC 4485, is a small glow just 3.5' north of the western end. Through my 18-inch scope, NGC 4490 has a mottled, splotchy appearance due to its numerous HII regions. At its western end, the galaxy is distorted into a teardrop shape with a faint extension that hooks sharply to the north toward NGC 4485.



5 THE COCOON GALAXY (NGC 4485/90) comprises two interacting spiral galaxies separated by 25,000 light-years in Canes Venatici. The larger of the pair, NGC 4490, shows numerous HII regions, which give it a splotchy, cocoon-shaped look.

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6 IRREGULAR GALAXY NGC 4449 lies in Canes Venatici. Active star formation is a hallmark of NGC 4449. This galaxy's structure and size are similar to those of the Large Magellanic Cloud, a small companion galaxy to the Milky Way.

7 SPIRAL GALAXY NGC 4559 lies some 30 million light-years away in the direction of Coma Berenices. Bright star-forming regions dot NGC 4559's spiral arms, and a dust lane lies along the galaxy's southern edge.

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8 SPIRAL GALAXY NGC 4605 in Ursa Major is brightest at its southeastern end. It shines at 10th magnitude but has splotchy surface brightness. This dwarf galaxy is classified as an SBc/P type, meaning it is a peculiar barred spiral galaxy. PRESTON JUSTIS

Head 2.5° north-northwest of the Cocoon to catch a view of the **Magellanic Dwarf** (NGC 4449). This fascinating irregular galaxy, which resembles our galaxy's large satellites, the Magellanic Clouds, contains an asymmetric bar studded with blazing regions of star formation. A 2001 Hubble study suggests an encounter with a neighboring galaxy may have triggered the formation of several super star clusters (SSCs), which are similar to young, massive globulars.

An 8-inch scope reveals a 4' by 2' oval surrounding a well-concentrated core and patchy, knotty structures. My 18-inch scope reveals several glowing HII regions scattered over an irregular, mottled surface. The largest is a high-surface-brightness knot on the galaxy's northern edge.

Glimpse fainter nebulous spots to the southeast and southwest. Directly attached to the south end of the core is another bright patch. I used 325x while searching for these extragalactic HII regions.

The next time you observe the popular edge-on showpiece called the Needle Galaxy (NGC 4565), head 2° north to a lesser-known 10th-magnitude spiral in Coma Berenices, **NGC 4559**. Images display a small central bulge embedded in filamentary spiral arms. Through a 6-inch or 8-inch scope, you'll find a 6' by 2.5' oval with modest brightening at its center.

Seen through an 18-inch scope, NGC 4559's halo extends 7' by 3'. The galaxy's structure is fascinating. Its surface brightness is irregular, with brighter and darker spots in the spiral arms. This mottling suggests dust lanes and HII regions. The southeast extension has an odd, boxy appearance and looks mottled. A trio of 12th-magnitude stars cradles this end of the galaxy.

Our next target, **NGC 4605**, is a peculiar 10th-magnitude spiral. Because of its location in Ursa Major, NGC 4605 is overshadowed by the well-known galaxies M81, M82, and M101. However, NGC 4605 is worth a visit. Through a 6-inch scope, you'll discover a 3' by 1' mottled oval sloping northwest to southeast that increases in brightness toward NGC 4605's center.

With my 18-inch scope, the galaxy increases in size to nearly 5' by 1.2' and shows hints of a tortured past. The southeast extension is clearly brighter and more

tapered than the galaxy's wider northwest end and exhibits a splotchy surface brightness. A slight kink in the major axis lies near the center, and the galaxy's two ends are misaligned.

The **Whale Galaxy** (NGC 4631) is a stunning 9th-magnitude edge-on object. This high-surface-brightness spindle spans 15.5' by 2.7' and displays noticeable mottling. Dust veins meander through bright regions of active star formation, triggered by past interactions with its neighbors, NGC 4627 and NGC 4656.

Through my 18-inch scope, the Whale Galaxy extends just beyond the edges of a 14' field, gradually bulging toward the center and tapering at its western tip. The Whale's mottled surface resolves into a maze of bright and dark patches, and the galaxy's northern edge has a distinctive serrated, or scalloped, appearance. A giant HII region, as well as several smaller luminous spots, lie near NGC 4531's center, along its north side. Companion galaxy NGC 4627 hovers just 2.5' northwest of the Whale Galaxy's center.

You'll find the **Hockey-Stick Galaxy** (NGC 4656/57) a mere 0.5' southeast of NGC 4631. An earlier encounter with NGC 4631 warped the Hockey-Stick Galaxy's disk and tidally twisted its northeast end, nearly detaching a chunk of the galaxy. When William Herschel discovered this galaxy in 1786, he described it as double and mentioned that "both join and form the letter 'S.'" The nickname "Hockey Stick" refers to this galaxy's distorted shape.

A 4-inch scope reveals an elongated 6' by 1' glow that is brighter and wider on the southwest end. Ten-inch and larger scopes will show the galaxy's northeast end brightens and hooks abruptly to the east — a result of tidal distortion. A faint piece is



9 THE WHALE GALAXY (NGC 4631) resembles the sea creature from which it takes its name. The Whale, the larger of the pair, has luminous spots along its northern edge. Seen edge-on, this spiral galaxy spans 15.5' and lies in Canes Venatici.

/// SPRINGTIME GALAXY TARGET LIST

Name	R.A.	Dec.	Con.	Mag.	Size
NGC 2903	9h32m	21°30'	Leo	9.0	12.6' by 6.0'
NGC 3115	10h05m	-07°43'	Sex	8.9	7.2' by 2.5'
NGC 3521	11h06m	-00°02'	Leo	9.0	11.0' by 5.1'
NGC 4244	12h17m	37°48'	CVn	10.4	16.6' by 1.9'
NGC 4449	12h28m	44°06'	CVn	9.6	6.2' by 4.4'
NGC 4490/85	12h31m	41°38'	CVn	9.8	2.3' by 1.6'
NGC 4559	12h36m	27°58'	Com	10.0	10.7' by 4.4'
NGC 4605	12h40m	61°37'	Uma	10.3	5.8' by 2.2'
NGC 4631	12h42m	32°32'	CVn	9.2	15.5' by 2.7'
NGC 4656/57	12h44m	32°10'	CVn	10.5	15.1' by 3.0'
NGC 5253	13h40m	-31°38'	Cen	10.4	5.0' by 1.9'
NGC 5981	15h38m	59°23'	Dra	13.2	3.0' by 0.5'
NGC 5982	15h39m	59°21'	Dra	11.1	3.0' by 3.1'
NGC 5985	15h40m	59°20'	Dra	11.1	5.5' by 3.0'

LEGEND

R.A. = right ascension in hours and minutes (2000.0) Dec. = declination in degrees and minutes (2000.0) Con. = constellation Mag. = magnitude ' = arcminutes



JIM BARCLAY

11 DWARF STARBURST GALAXY NGC 5253 is an amorphous oval galaxy some 12 million light-years away in Centaurus. Discovered by John Herschel in 1787, NGC 5253 has an active star-forming core packed with myriad star clusters.

nearly detached at the northeast tip and appears tilted at a steep angle.

Although many observers are familiar with barred spiral M83 in Hydra, a little-known gem, **NGC 5253**, lies 1.9° south-southeast. Seen through an 8-inch scope, you'll find a prominent oval angling southwest to northeast. The concentrated core is a region of intense star formation, classifying NGC 5253 as a dwarf starburst galaxy. At roughly 12 million light-years away, it's the closest starburst galaxy to Earth.

Observing through an 18-inch scope from Australia with NGC 5253 high overhead, the galaxy extended 4' by 1' and brightened to an intense 20"-long core. I

saw a bright, nearly stellar knot attached to the core's northeast edge. This may be one of many super star clusters.

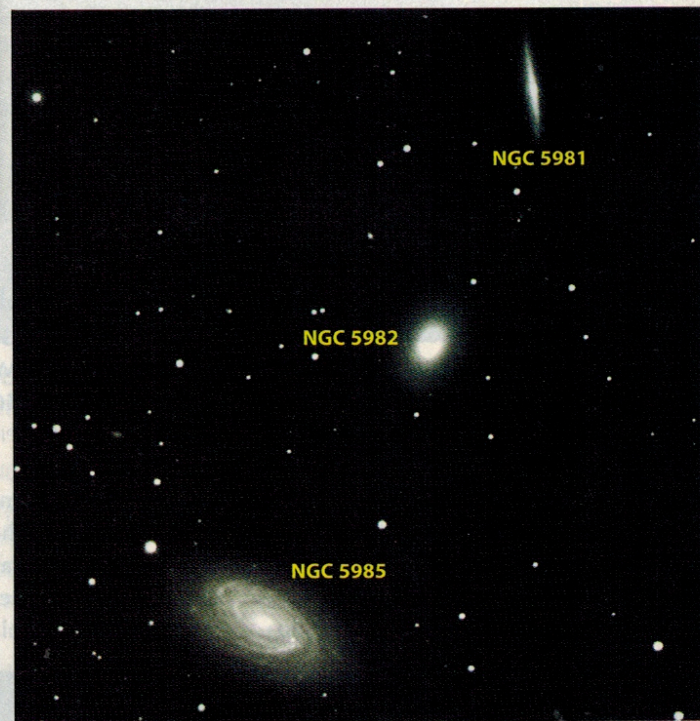
For our last target, let's try a three-for-one special: **NGC 5981**, **NGC 5982**, and **NGC 5985**. Less than 2° east-northeast of 3.3-magnitude Edasich (Iota [ι] Draconis), galaxy trio NGC 5981, NGC 5982, and NGC 5985 lies strung out perfectly on a line 14' long. Better yet, they form a galaxy sampler with an edge-on, an elliptical, and a nearly face-on spiral!

An 8-inch displays elliptical galaxy NGC 5982 as a 1.2' by 1.0' oval with a small, concentrated core. About 7' east is NGC 5985, a larger, nearly face-on spiral with a lower-



MACE HOOLEN

10 THE HOCKEY-STICK GALAXY (NGC 4656/57) in Canes Venatici is a large spiral. Twisted out of shape by neighboring galaxy NGC 4631 to the northwest (not shown), the Hockey Stick has a bright knot on its southern end and a smaller, nearly detached area on its northeastern side.



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12 GALAXY TRIO NGC 5981, NGC 5982, and NGC 5985 offers a sampling of the three main galaxy types. The largest of the group, NGC 5985, is a face-on spiral. NGC 5982, center, is an elliptical. Long, slender NGC 5981 is an edge-on galaxy.

surface-brightness disk. Through my 18-inch scope, the disk extends 4' by 2.5' and appears mottled with strong spiral structure. NGC 5981 is a challenge for an 8- or 10-inch scope. Look 6' west of NGC 5982 for a faint, narrow splinter sloping northwest to southeast.

These often overlooked galaxies await your gaze. Pick out a few and give them a try on the next clear spring evening. Once you've gotten your fill of these springtime galaxies, visit www.astronomy.com/toc for a list of additional targets to explore. ■

ONLINE
EXTRA

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