Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

www.mvastro.org

Membership Meeting

Saturday, May 11th 2019
7:00pm at the
Herrett Center for Arts & Science
College of Southern Idaho.

Public Star Party follows at the Centennial Observatory

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Magic Valley Astronomical Society is a member of the Astronomical League

M-51 imaged by
Rick Widmer &
Ken Thomason
Herrett Telescope
Shotwell Camera

MVAS President's Message

May 2019

Colleagues,

One of the aspects that makes Astronomy exciting is the field continues to evolve, and it's not uncommon to get new, exciting developments every month. If it had not been for the first picture of a black hole just a few weeks ago, we'd be talking this week about the first registered Marsquake or the observation of Buckyballs. Even those, however, have now been overshadowed by the studies that are examining the claim that the current rate of the universe's expansion may be nine percent faster than it was at the beginning of the universe.

And hopefully we'll catch up the tide of all that news, now that May's upon us and the weather's starting to show signs of improvement. This Saturday, May 4th, we'll be over at the Jerome Gun Club for a star party. This would be the first one of the year, weather permitting, so we hope to see you there.

The following Saturday, May 11, we'll start our day early at the Herrett Center. Not only will we have a Show-And-Tell session follow Gary Leavitt's presentation on Asterisms for the evening MVAS meeting at 7 p.m., but it's Astronomy Day at the Herrett Center. That starts around 11 a.m., and we can always use more volunteers.

Until then, get out there and enjoy the skies.

Clear Views,

Rob Mayer

Calendar

May 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4 New Moon Lunation 1190 1% Visible ↓ Age: 29.38 Days 
5	6	7	8	9	10	11 MVAS Meeting at 7:00pm at the Herrett Center Public Star Party Centennial Obs. 7:30 – Midnight 1st Quarter Moon
12 Mother's Day 	13	14	15	16	17	18 Full Moon 100% Visible Age: 15.27 Days Planting Moon 
19	20	21	22	23	24	25
26 Last Quarter Visible 48% ↓ Age: 22.43 Days 	27 Memorial Day 	28	29	30	31	

Snake River Skies is the Newsletter of the Magic Valley Astronomical Society and is published electronically once a month.
 Full Moon names follow the traditional Algonquin First Nation history.

Be Careful – Be Safe – Get Out There – Explore Your Universe

May Celestial Calendar by Dave Mitsky

5/5 Today is May Day or Beltane, a cross-quarter day; the peak of the Eta Aquarid meteor shower (20 per hour for northern hemisphere observers)
5/6 The Moon is 7.9 degrees south-southeast of the bright open cluster M45 (the Pleiades or Subaru) in Taurus at 5:00; the Moon is 2.2 degrees north of the first-magnitude star Aldebaran (Alpha Tauri)
5/8 The Moon is 3.2 degrees south-southeast of Mars at 1:00; Mercury (magnitude -0.8) is 1.3 degrees south-southeast of Uranus (magnitude +5.9)
5/9 The Moon is at descending node (longitude 109.3 degrees)
5/10 The Moon is 6.3 degrees south of the first-magnitude star Pollux (Beta Geminorum) at 3:00; Venus is at its southernmost latitude from the ecliptic plane (-3.4 degrees)
5/11 The Moon lies within the bright open cluster M44 (the Beehive Cluster or Praesepe) in Cancer at 2:00; the Lunar X (also known as the Werner or Purbach Cross), an X-shaped clair-obscure illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to be fully formed at 16:25; asteroid 8 Flora (magnitude +9.8) is at opposition
5/11 First Quarter Moon; the Moon is 2.9 degrees north-northeast of the first-magnitude star Regulus (Alpha Leonis)
5/13 The Moon is at perigee, subtending 32' 23" from a distance of 369,009 kilometers (229,291 miles)
5/14 The equation of time is at a maximum of 3.65 minutes at 9:00; asteroid 11 Parthenope (magnitude +9.5) is at opposition at 10:00; the Sun enters Taurus (longitude 53.47 degrees on the ecliptic)
5/16 The Moon is 7.1 degrees north-northeast of the first-magnitude star Spica (Alpha Virginis) at 12:00; Mars is at its northernmost declination (24.6 degrees)
5/18 Venus (magnitude -3.9) is 1.1 degrees south-southeast of Uranus (magnitude +5.9)
5/19 Mercury is at the ascending node through the ecliptic plane at 15:00; Mars is 0.2 degree north of the bright open cluster M35 in Gemini at 16:00; the Moon is 1.2 degrees south of the dwarf planet/asteroid 1 Ceres, with an occultation occurring in parts of Antarctica, at 18:00; the Moon is 7.8 degrees north-northeast of the first-magnitude star Antares (Alpha Scorpii)
5/20 Asteroid 20 Massalia (magnitude +9.8) is at opposition at 13:00; the Moon is 1.7 degrees north-northeast of Jupiter.
5/21 The Sun's longitude is 60 degrees at 8:00; Mercury is in superior conjunction (a distance of 1.322 a.u. from Earth and a latitude of 1.42 degrees) with the Sun at 13:00; Mercury is 3.7 degrees south-southeast of M45.
5/22 The Moon is at the descending node (longitude 288.5 degrees) at 19:00; the Moon, Saturn, and Pluto lie within a circle with a diameter of 2.94 degrees at 23:00; the Moon is 0.5 degree south of Saturn.
5/23 The Moon is 0.1 degree south of Pluto.
5/24 Mercury is at perihelion (0.3075 a.u. from the Sun) at 7:00
5/25 Mercury is 6.5 degrees north-northwest of Aldebaran at 18:00
5/26 The Moon is at apogee, subtending 29' 34" from a distance of 404,137 kilometers (251,119 miles)
5/27 The Curtiss Cross, an X-shaped clair-obscure illumination effect located between the craters Parry and Gambart, is predicted to be visible at 19:32; the Moon is 3.5 degrees south-southeast of Neptune.
5/28 The dwarf planet/asteroid 1 Ceres (magnitude +7.0) is at opposition.
5/30 The Moon is 0.6 degree north of asteroid 4 Vesta, with an occultation occurring in northwestern North America, the Aleutian Islands, northwestern Micronesia, eastern Asia, and parts of Indonesia, at 22:00 UDT
5/31 The Moon is 4.5 degrees south-southeast of Uranus at 14:00

The first recorded perihelion passage of Comet Halley (1P/Halley) occurred on May 25, 240 BC. Thales of Miletus accurately predicted a solar eclipse on May 28, 585 BC. The German astronomers Gottfried and Maria Magarethe Kirch discovered the bright globular cluster M5 on May 5, 1702. On May 1, 1759, the English amateur astronomers John Bevis and Nicholas Munckley observed Comet Halley on its first predicted return. The French astronomer Charles Messier discovered the globular cluster M3 on May 3, 1764 and the globular cluster M10 on May 29, 1764. The Italian astronomer Annibale de Gasparis discovered asteroid 11 Parthenope on May 11, 1850. Asteroid 14 Irene was discovered on May 19, 1851 by the English astronomer John Russell Hind. The German astronomer Robert Luther discovered asteroid 26 Proserpina on May 6, 1853. The Australian astronomer John Tebbutt discovered the Great Comet of 1861 on May 13. The English astronomer Norman Pogson discovered asteroid 80 Sappho on May 2, 1864. Norman Pogson discovered asteroid 87 Sylvia on May 16, 1866. The 40-inch Clark refractor at the Yerkes Observatory saw first light on May 21, 1897. The Griffith Observatory opened to the public on May 14, 1935. Nereid, Neptune's third-largest satellite, was discovered on May 1, 1949 by the Dutch-American astronomer Gerard Kuiper.

The Sun, the Moon, & the Planets

The Sun is located in Aries on May 1st. It enters Taurus on May 14th.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on May 1st: Mercury (magnitude -0.4, 5.8", 75% illuminated, 1.15 a.u., Pisces), Venus (magnitude -3.8, 11.5", 88% illuminated, 1.45 a.u., Pisces), Mars (magnitude +1.6, 4.2", 96% illuminated, 2.24 a.u., Taurus), Jupiter (magnitude -2.5, 43.5", 100% illuminated, 4.54 a.u., Ophiuchus), Saturn (magnitude +0.5, 17.2", 100% illuminated, 9.67 a.u., Sagittarius), Uranus on May 16th (magnitude +5.9, 3.4", 100% illuminated, 20.79 a.u., Aires), Neptune on May 16th (magnitude +7.9, 2.3", 100% illuminated, 30.33 a.u., Aquarius), and Pluto on May 16th (magnitude +14.2, 0.1", 100% illuminated, 32.72 a.u., Sagittarius).

In the evening, Mercury is in the northwest and Mars is in the west. Jupiter is located in the southeast at midnight. Mercury, Venus, and Uranus can be seen in the east, Saturn in the south, Jupiter in the southwest, and Neptune in the southeast at dawn.

Mercury can be seen extremely low in the east during early part of the month. A very slender waning crescent Moon passes three degrees to the south of Mercury on May 3rd. Mercury is in superior conjunction on May 21st. As May ends, the speediest planet enters the evening sky and can be seen to the lower right of Mars in the west-northwest 30 minutes after the Sun sets. Mercury shines brightly at magnitude -1.2 at that time.

During May, **Venus** rises about an hour before the Sun and shines at its minimum brightness of magnitude -3.8. A thin waning crescent Moon passes four degrees south of the planet on May 2nd. Venus lies 1.2 degrees south of Uranus on May 18th.

Mars lies between the horns of Taurus, Beta and Zeta Tauri, on May 6th. A waxing crescent Moon passes three degrees south of the Red Planet on May 7th. Mars shrinks to 3.9 arc seconds and shines at only magnitude +1.8 by the end of May. Mars departs Taurus and enters Gemini by the middle of the month.

Jupiter increases in apparent size from 43.5 to 45.8 arc seconds this month. The waning gibbous Moon passes less than two degrees to the north of Jupiter on May 20th. The orbital plane of the Galilean satellites is currently inclined three degrees to our line of sight. A shadow transit by Ganymede begins at 3:42 a.m. EDT on the morning of May 7th. On the morning of May 18th, Ganymede reappears from occultation at 2:16 a.m. EDT. Io's shadow begins to transit the planet at 3:44 a.m. EDT followed by Io itself at 4:17 a.m. EDT. Ganymede begins to disappear into eclipse to the west of Jupiter at 1:41 a.m. EDT on the morning of May 25th, an event that will take 14 minutes to transpire. Articles on observing Jupiter and the Great Red Spot (GRS) appear on pages 52 and 53 respectively of the May 2019 issue of Sky & Telescope. Browse http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/ or http://www.projectpluto.com/jeve_grs.htm in order to determine transit times of Jupiter's central meridian by the GRS. GRS transit information also appears on pages 50 and 51 of the May 2019 issue of Sky & Telescope. Data on the Galilean satellite events is available on page 51 of the May 2019 issue of Sky & Telescope and online at http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/ and http://www.projectpluto.com/jevent.htm

Saturn retrogrades through eastern Sagittarius this month. It shines at magnitude +0.4 and has an apparent equatorial diameter of almost 18 arc seconds at mid-month. Saturn's rings subtend more than 40 arc seconds and are inclined by nearly 24 degrees at that time. In late May, Saturn nears the meridian as morning twilight begins. The waning gibbous Moon passes one half degree south of Saturn on May 22nd. Eighth-magnitude Titan, Saturn's brightest satellite, is located south of the planet on May 4th and May 20th and north of it on May 12th and May 28th. Saturn's odd satellite Iapetus shines faintly at eleventh magnitude when it passes north of Saturn on May 18th and May 19th. For further information on Saturn's satellites, browse http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/

Uranus can be seen once again during morning twilight during the second half of May. Venus passes 1.2 degrees due south of Uranus on May 18th. On May 31st, the waning crescent Moon passes 4.5 degrees south-southeast of Uranus. The two celestial objects rise more than an hour before the Sun on that date.

Neptune is located 1.2 degrees east-northeast of the fourth-magnitude star Phi Aquarii in eastern Aquarius this month. The waning crescent Moon passes 3.5 degrees south-southeast of Neptune on May 27th. Neptune reaches an altitude of nearly 20 degrees in east-southeast as morning twilight begins on the final day of the month.

Pluto lies in northeastern Sagittarius and transits the meridian before dawn.

The Moon is 25.5 days old, is illuminated 16.2%, subtends 29.3 arc minutes, and is located in Aquarius on May 1st at 0:00 UT. The Moon is at its greatest northern declination on May 9th (+22.2 degrees). The Moon is at its greatest its greatest southern declination on May 22nd (-22.3 degrees). Longitudinal libration is at maximum (+5.0 degrees) on May 19th and at minimum (-5.0 degrees) on May 6th. Latitudinal libration is at maximum (+6.6 degrees) on May 3rd and again (+6.7 degrees) on May 30th and at minimum (-6.6 degrees) on May 16th. The Moon is at apogee (distance 63.36 Earth-radii) on May 26th and at perigee (distance 57.86 Earth-radii) on May 13th. New Moon occurs on May 4th. The Moon occults 4 Vesta on May 2nd and May 30th, 1 Ceres on May 19th, Saturn on May 22nd, and Pluto on May 23rd from certain parts of the world. Consult http://www.lunar-occultations.com/iota/iotandx.htm for more on lunar occultations. Visit http://saberdoesthestars.wordpress.com/2011/07/05/saber-does-the-stars/ for tips on spotting extreme crescent Moons. Click on http://www.calendar-12.com/moon_calendar/2019/may for a lunar phase calendar. Times and dates for the lunar light rays predicted to occur this month are available at http://www.lunar-occultations.com/rlo/rays/rays.htm

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Asteroids

The dwarf planet/asteroid 1 Ceres (magnitude +7.0) reaches opposition in western Ophiuchus on May 28th. Ceres retrogrades into Scorpius shortly thereafter. A finder chart can be found on page 48 of the May 2019 issue of Sky & Telescope. With a diameter of 940 kilometers (585 miles), Ceres is the largest object in the main asteroid belt and is the only asteroid to be differentiated, i.e., to have layers. Other asteroids brighter than magnitude +11.0 that reach opposition this month include 8 Flora (magnitude +9.8) on May 12th, 11 Parthenope (magnitude +9.5) on May 14th, 68 Leto (magnitude +10.7) on May 14th, 20 Massalia (magnitude +9.8) on May 20th, and 32 Pomona (magnitude +10.5) on May 27th. Information on asteroid occultations taking place this month is available at http://www.asteroidoccultation.com/2019_05_si.htm

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Carbon Star

May's Carbon Star: SS Virginis - Right Ascension: $12^h\ 25^m\ 14.3952^s$ Declination: +00° 46′ 10.9467″

Comets

Comet C/2017 M4 (ATLAS) passes west-southwestward through Scorpius and into Lupus in May. This faint comet is located five degrees west of the third-magnitude star Mu1 Scorpii on May 1st. It passes a bit more than one degree north of the ninth-magnitude globular cluster NGC 6139 on May 3rd and 1.3 degrees south of the third-magnitude star Eta Lupi on May 13th. Visit http://cometchasing.skyhound.com/ and http://www.aerith.net/comet/weekly/current.html for information on comets visible this month.

Meteors

The broad peak of the Eta Aquarid meteor shower is not adversely affected by moonlight this year. Southern hemisphere observers are favored. Eta Aquarid meteors are debris from the famous periodic comet 1P/Halley. The radiant is located close to the Water Jug asterism in Aquarius. See https://www.amsmeteors.org/meteor-showers/meteor-shower-calendar/#eta+Aquariids and page 48 of the May 2019 issue of Sky & Telescope for additional information on the Eta Aquarids.

Orbiting Earth

Information on Iridium flares and passes of the ISS, the Tiangong-2, the USAF's X-37B, the HST, and other satellites can be found at http://www.heavens-above.com/. Satellite information with ISS Live HD streaming https://www.n2yo.com

Information on the celestial events transpiring each week can be found at http://astronomy.com/skythisweek and http://www.skyandtel...ky-at-a-glance/

The Deep Sky

Eighty binary and multiple stars for May: 1 Bootis, Struve 1782, Tau Bootis, Struve 1785, Struve 1812 (Bootes); 2 Canum Venaticorum, Struve 1624, Struve 1632, Struve 1642, Struve 1645, 7 Canum Venaticorum, Alpha Canum Venaticorum (Cor Caroli), h2639, Struve 1723, 17 Canum Venaticorum, Otto Struve 261, Struve 1730, Struve 1555, h1234, 25 Canum Venaticorum, Struve 1769, Struve 1783, h1244 (Canes Venatici); 2 Comae Berenices, Struve 1615, Otto Struve 245, Struve 1633, 12 Comae Berenices, Struve 1639, 24 Comae Berenices, Otto Struve 253, Struve 1678, 30 Comae Berenices, Struve 1684, Struve 1685, 35 Comae Berenices, Burnham 112, h220, Struve 1722, Beta Comae Berenices, Burnham 800, Otto Struve 266, Struve 1748 (Coma Berenices); h4481, h4489, Struve 1604, Delta Corvi, Burnham 28, h1218, Struve 1669 (Corvus); H N 69, h4556 (Hydra); Otto Struve 244, Struve 1600, Struve 1695, Zeta Ursae Majoris (Mizar), Struve 1770, Struve 1795, Struve 1831 (Ursa Major); Struve 1616, Struve 1627, 17 Virginis, Struve 1648, Struve 1658, Struve 1677, Struve 1682, Struve 1689, Struve 1690, 44 Virginis, Struve 1719, Theta Virginis, 54 Virginis, Struve 1738, Struve 1740, Struve 1751, 81 Virginis, Struve 1764, Struve 1775, 84 Virginis, Struve 1788 (Virgo)

One hundred and sixty-five deep-sky objects for May: NGC 5248 (Bootes); M3, M51, M63, M94, M106, NGC 4111, NGC 4138, NGC 4143, NGC 4151, NGC 4214, NGC 4217, NGC 4244, NGC 4346, NGC 4369, NGC 4449, NGC 4485, NGC 4490, NGC 4618, NGC 4631, NGC 4656, NGC 4868, NGC 5005, NGC 5033, NGC 5297, NGC 5353, NGC 5354, Up 1 (Canes Venatici); Mel 111, M53, M64, M85, M88, M91, M98, M99, M100, NGC 4064, NGC 4150, NGC 4203, NGC 4212, NGC 4251, NGC 4274, NGC 4278, NGC 4293, NGC 4298, NGC 4302, NGC 4314, NGC 4350, NGC 4414, NGC 4419, NGC 4448, NGC 4450, NGC 4459, NGC 4473, NGC 4474, NGC 4494, NGC 4559, NGC 4565, NGC 4651, NGC 4689, NGC 4710, NGC 4725, NGC 4874, NGC 5053 (Coma Berenices); NGC 4027, NGC 4038-9, NGC 4361 (Corvus); M68, M83, NGC 4105, NGC 4106, NGC 5061, NGC 5101, NGC 5135 (Hydra); M40, NGC 4036, NGC 4041, NGC 4051, NGC 4062, NGC 4085, NGC 4088, NGC 4096, NGC 4100, NGC 4144, NGC 4157, NGC 4605, NGC 5308, NGC 5322 (Ursa Major); M49, M58, M59, M60, M61, M84, M86, M87, M89, M90, M104, NGC 4030, NGC 4073, NGC 4168, NGC 4179, NGC 4206, NGC 4215, NGC 4216, NGC 4224, NGC 4235, NGC 4260, NGC 4261, NGC 4267, NGC 4281, NGC 4339, NGC 4343, NGC 4365, NGC 4371, NGC 4378, NGC 4380, NGC 4387, NGC 4388, NGC 4402, NGC 4429, NGC 4435, NGC 4438, NGC 4517, NGC 4526, NGC 4535, NGC 4536, NGC 4546, NGC 4550, NGC 4551, NGC 4567, NGC 4568, NGC 4570, NGC 4593, NGC 4596, NGC 4636, NGC 4638, NGC 4639, NGC 4643, NGC 4654, NGC 4666, NGC 4697, NGC 4698, NGC 4699, NGC 4753, NGC 4754, NGC 4760, NGC 4762, NGC 4866, NGC 4900, NGC 4958, NGC 5044, NGC 5054, NGC 5068, NGC 5077, NGC 5084, NGC 5087, NGC 5147, NGC 5170, NGC 5247, NGC 5363, NGC 5364 (Virgo)

Top ten deep-sky objects for May: M3, M51, M63, M64, M83, M87, M104, M106, NGC 4449, NGC 4565

Top ten deep-sky binocular objects for May: M3, M51, M63, M64, M84, M86, M87, M104, M106, Mel 111

Challenge deep-sky object for May: 3C 273 (Virgo)

The objects listed above are located between 12:00 and 14:00 hours of right ascension.

A wealth of current information on solar system celestial bodies is posted at http://www.curtrenz.com/astronomy.html and http://nineplanets.org/ | Various events taking place within our solar system are discussed at http://www.bluewaterastronomy.info/styled-4/index.html

Information on the celestial events transpiring each week can be found at http://astronomy.com/skythisweek and http://www.skyandtelescope.com/observing/sky-at-a-glance/

Free star maps for March can be downloaded at http://www.skymaps.com/downloads.html and http://www.telescope.com/content.jsp?pageName=Monthly-Star-Chart

The famous eclipsing variable star Algol (Beta Persei) is at a minimum, decreasing in magnitude from 2.1 to 3.4, on April 2nd, 5th, 8th, 11th, 14th, 16th, 19th, 22nd, 25th, and 28th. A favorable date for observing Algol at mid-eclipse from the eastern United States is on April 10th at 11:49 p.m. EDT or 3:49 UT on April 11th. For more on Algol, see http://stars.astro.i.../sow/Algol.html and http://www.solstatio...rs2/algol3.htm

Data on current supernovae can be found at http://www.rochesterastronomy.org/snimages/

It is possible to observe all 109 (or 110) Messier objects during a single night around the time of the vernal equinox, if the Moon phase and local latitude are favorable. For information on running a so-called Messier Marathon, browse http://messier.seds.org/xtra/marathon/marathon.html and http://www.richardbell.net/marathon.html

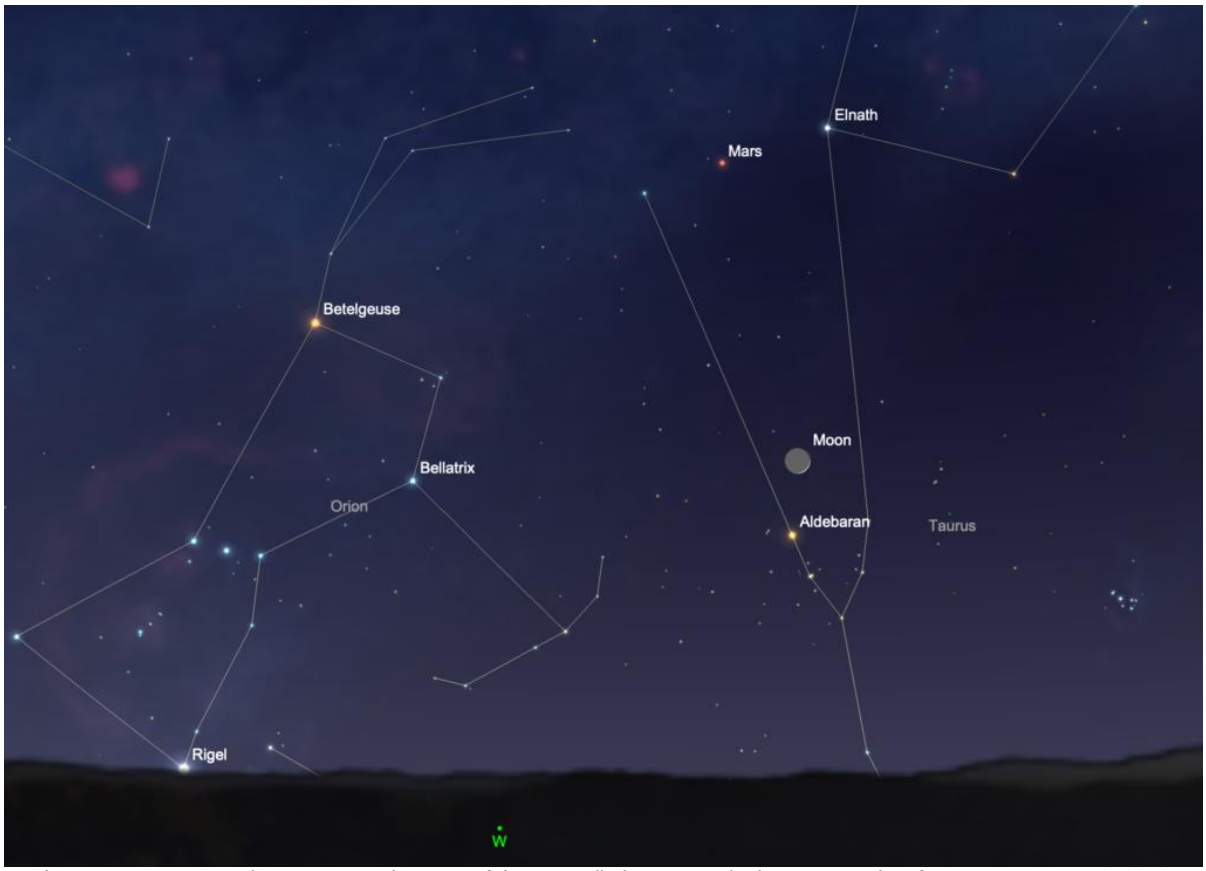
Information on observing some of the more prominent Messier galaxies is available at http://www.cloudynights.com/topic/358295-how-to-locate-some-of-the-major-messier-galaxies-and-helpful-advice-for-novice-amateur-astronomers/

Finder charts for the Messier objects and other deep-sky objects are posted at https://freestarcharts.com/messier and https://freestarcharts.com/ngc-ic and http://www.cambridge.org/features/turnleft/seasonal_skies_january-march.htm

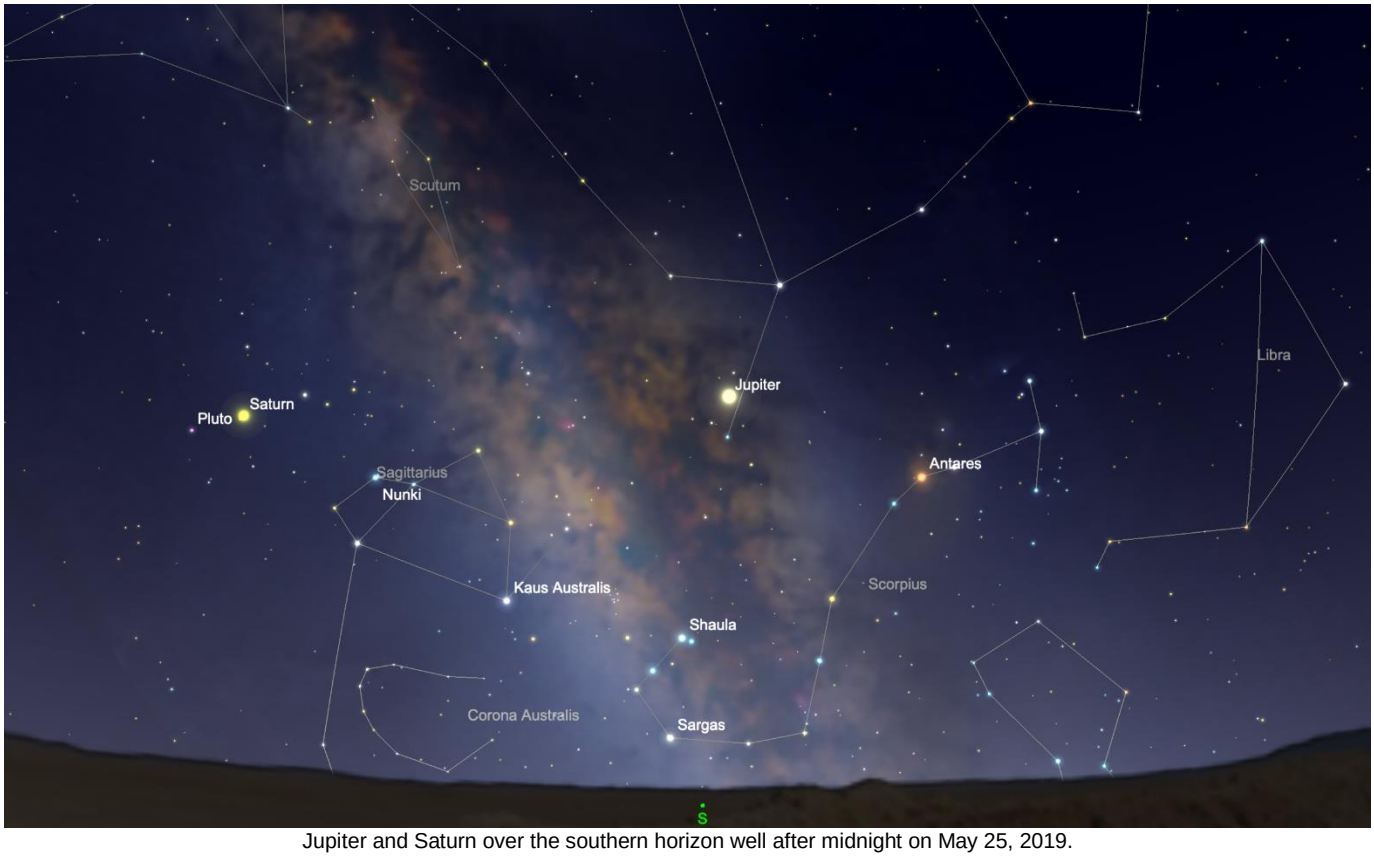
Telrad finder charts for the Messier Catalog and the SAC's 110 Best of the NGC are posted at http://www.astro-tom.com/messier/messier_finder_charts/map1.pdf and http://www.saguaroastro.org/content/db/Book110BestNGC.pdf respectively.

Deep-sky object list generators can be found at https://dso-browser.com/ and http://www.virtualcolony.com/sac/ and http://tonightssky.com/MainPage.php

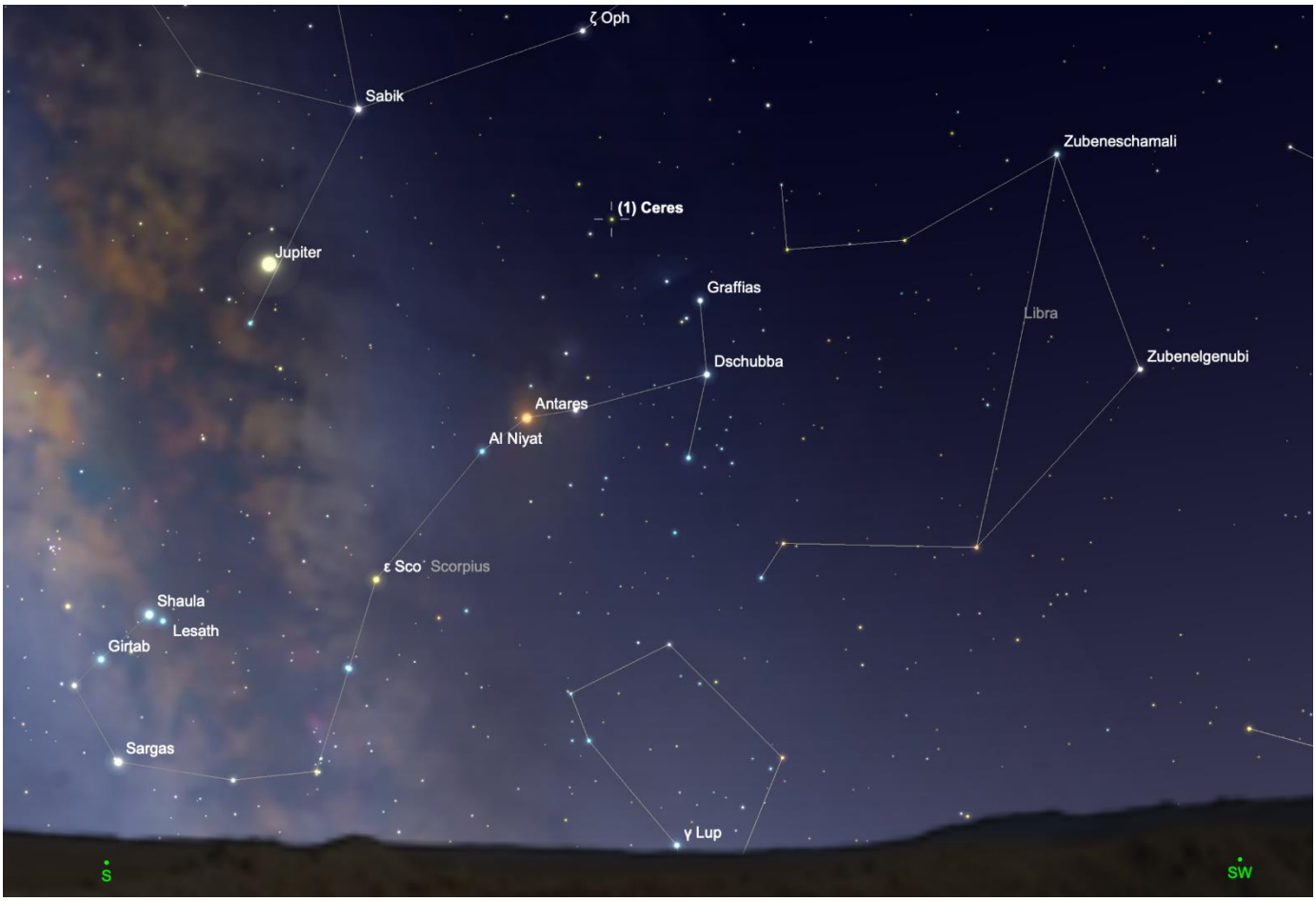
Free sky atlases can be downloaded at http://www.deepskywatch.com/files/deepsky-atlas/Deep-Sky-Hunter-atlas-full.pdf and https://www.cloudynights.com/articles/cat/articles/observing-skills/free-mag-7-star-charts-r1021 and https://allans-stuff.com/triatlas/



The crescent Moon and Mars among the stars of the constellation Taurus in the western sky after sunset on May 6, 2019.



Jupiter and Saturn over the southern horizon well after midnight on May 25, 2019.



The location of the dwarf planet and asteroid 1 Ceres at opposition on May 28, 2019.

Planet Plotting
May morning skies reward early risers with Jupiter (-2.2 to -2.4) in Ophiuchus, Saturn (+0.5 to +0.3) in Sagittarius, Venus (-3.8) in Pisces and Aries, Uranus (+5.9) in Aries, and Neptune (+7.9) in Aquarius. The planets appear in the southeastern sky with Jupiter rising before midnight EDT in early May, followed by Saturn about 2 hours later, and the last three rise in the twilit skies of dawn. At the beginning of the month, Mercury (+0.2) in Pisces may be visible north of Venus right above the horizon. Both will sink deeper into the glow of sunrise during May as Neptune moves higher in the dawn sky.

Mars (+1.5 to +1.6) in Taurus and Mercury (+0.2 to -2.2 to -1.1) in Pisces, Aries, and Taurus, are evening planets in May. Mars is low in the early evening western sky and sets before 11:00PM EDT on the 1st and about 10pm EDT on the 31st. Mercury will not appear in the western sky until very late in May after its conjunction with the Sun on the 21st.

The waning crescent Moon is 4° from Venus at 8AM EDT on the 2nd, 3° from Mercury at 2:00AM EDT on the 3rd, 4° from Neptune at 1:00PM EDT on the 27th, and 5.9° from Uranus at 6:00AM EDT on the 31st. Its waxing crescent is 3° from Mars at 8:00PM EDT on the 7th and a waning gibbous Moon is 1.7° from Jupiter at 1:00PM EDT on the 20th and 0.5° from Saturn at 6:00PM EDT on the 22nd

Planet	Constellation(s)	Magnitude	Planet Passages	Time, Date
Sun	Aquarius, Taurus	-26.8	New Moon	4:50AM EDT, 5/4
Mercury	Pisces, Aries, Taurus	+0.2 to -2.2 to +1.1	Uranus, 1.26°NNW Superior Conjunction	Noon EDT, 5/8 9:00AM EDT, 5/21
Venus	Pisces, Aries	-3.8	Uranus, 1.2°N	4:00AM EDT, 5/18
Mars	Taurus, Gemini	+1.6 to +1.8		
Jupiter	Ophiuchus	-2.2 to -2.4		
Saturn	Sagittarius	+0.5 to +0.3		
Uranus	Aries	+5.9	Mercury, 1.26°SSE Venus, 1.2°S	Noon EDT, 5/8 4:00AM EDT, 5/18
Neptune	Aquarius	+7.9		

May Moon
May's New Moon is on the 5th at 4:50AM EDT. It is the beginning of Lunation 1192 which ends 29.47 days later with the New Moon of June on the 3rd at 6:02AM EDT.

The Full Moon on the 18th at 5:11PM EDT. The May Moon is known as the "Planting or Milk Moon". Colonial Americans called the May Moon the "Milk Moon" and Celts called it the "Bright Moon". It was named the "Hare Moon" in Medieval England. Chinese refer to it as the "Dragon Moon" and the Anishinaabe (Odawa and Ojibwe) people recognize it as "Zaagibagaa-giizis" (Budding Moon.)
Lunar Perigee (minimum orbital distance) is on the 13th at 5:53PM EDT when the Moon is at a distance of 229,291 miles. (57.86 Earth radii). Apogee occurs on the 26th at 9:27AM EDT when the Moon is at 251,119 miles (63.36 Earth radii).

Planet	Constellation	Magnitude	Moon Passages	Moon Phase, Moon Age
Sun	Aries	-26.8	6:46PM EDT, 5/4	New, 0 days
Mercury	Pisces	-0.4	3.0°S, 2:00AM EDT, 5/3	Waning Crescent, 27.62 days
Venus	Pisces	-3.8	4.0°S, 8:00AM EDT, 5/2	Waning Crescent, 27.13 days
Mars	Taurus	+1.7	3.0°S, 8:00PM EDT, 5/7	Waxing Crescent, 2.34 days
Jupiter	Ophiuchus	-2.4	1.7°N, 1:00PM EDT, 5/20	Waning Gibbous, 15.47 days
Saturn	Sagittarius	+0.3	0.5°S, 6:00PM EDT, 5/22	Waning Gibbous, 17.63 days
Uranus	Aries	+5.9	5.9°S, 6:00AM EDT, 5/31	Waning Crescent, 26.59 days
Neptune	Aquarius	+7.9	4.0°S, 1:00PM EDT, 5/27	Waning Crescent, 22.38 days

Mars Rovers Update

Opportunity's mission is complete as of Sols 5347 to 5353 (Feb. 7, 2019 - Feb. 13, 2019). No response has been received from Opportunity since Sol 5111 (June 10, 2018,) due to a planet-encircling dust storm on Mars. With the last uplink transmission on Sol 5352 (Feb. 12, 2019), the rover recovery efforts are concluded. Total odometry on Mars for the rover was 28.06 miles (45.16 kilometers).

The InSight lander arrived on Elysium Planitia on Mars on Nov. 26, 2018. It immediately unfurled its solar panels and radio antenna and successfully deployed its seismometer on the Martian surface by December 19. The mole carrying the Heat Flow and Physical Properties Package (HP3) instrument burrowed 30 cm. into the ground for the first time on Feb. 28 with its hammer drill and encountered a zone through which it could not penetrate. German scientists who designed the mole are now conducting a series of tests on Earth which are designed to evaluate and solve the drilling problem. Measurements of conditions during the drilling include temperature data, visual images, and seismic data recorded during hammering provided a basis for designing the tests which include the possibilities that the mole may have encountered a large rock through which it was unable to drill, or the Mars sand may be more cohesive than expected causing hammering induced cavities to form around the mole, allowing it to shift sideways instead of drilling downwards. Despite the drilling difficulties, InSight is actively continuing with other measurements. These include surface weather conditions, magnetic field measurements, and detection of small seismic events on March 14, April 10, April 11, and a larger event on April 6 that may represent a likely “mars quake.”

The Curiosity Rover is investigating 16,404 foot Mt. Sharp at Gale Crater’s center in its search for evidence of pre-existing life on Mars. Curiosity is within Glen Torridon the clay-bearing unit adjacent to Vera Rubin Ridge which was the target of investigation of the rovers activities even before the spacecraft was launched because it may hold more clues about the ancient lakes that helped form the lower levels on Mt. Sharp. Curiosity drilled a piece of bedrock nicknamed Aberlady on Saturday, April 6 (Sol 2,370), and delivered the sample to its internal mineralogy lab on Wednesday, April 10 (Sol 2374).

The rock was easily drilled by the rover in contrast to harder rocks drilled earlier on Vera Rubin Ridge. The drill didn't even use its percussive technique. This was the mission's first sample obtained using only rotation of the drill bit.

"Curiosity has been on the road for nearly seven years," said Curiosity Project Manager Jim Erickson of NASA's Jet Propulsion Laboratory in Pasadena, California. "Finally drilling at the clay-bearing unit is a major milestone in our journey up Mount Sharp."

Clay minerals are tempting targets for analysis because they usually form in water. NASA's Mars Reconnaissance Orbiter (MRO) spied a strong clay "signal" here long before Curiosity landed in 2012 and discovery of the signal’s source could determine if a wetter Martian era shaped this layer of Mount Sharp, the 3-mile-tall (5-kilometer-tall) mountain.

Clay minerals in mudstones were found before in many places on Mars. The mudstones formed as rivers entered ancient lakes nearly 3.5 billion years ago and deposited their sediment load. As with water elsewhere on Mars, the lakes eventually dried up, and the buried sediment was compacted into mudstone.

The region clearly has several other clues to reveal. There are several kinds of bedrock and sand, including active sand ripples that have shifted in the past year. Pebbles are scattered everywhere - are they eroding from the local bedrock? Several eye-catching landmarks, such as Knockfarril Hill, stick out as well.

"Each layer of this mountain is a puzzle piece," said Curiosity Project Scientist Ashwin Vasavada of JPL. "They each hold clues to a different era in Martian history. We're excited to see what this first sample tells us about the ancient environment, especially about water."

The Aberlady sample will give the team a starting point for investigation of the clay-bearing unit. Mission scientists plan to drill into the unit several more times over the course of the next year. That will help them understand what makes this region different from Vera Rubin Ridge behind it and an area higher on the mountain in which the NASA Mars Reconnaissance Orbiter (MRO) detected a sulfate signal.

Phil Harrington's Cosmic Challenge

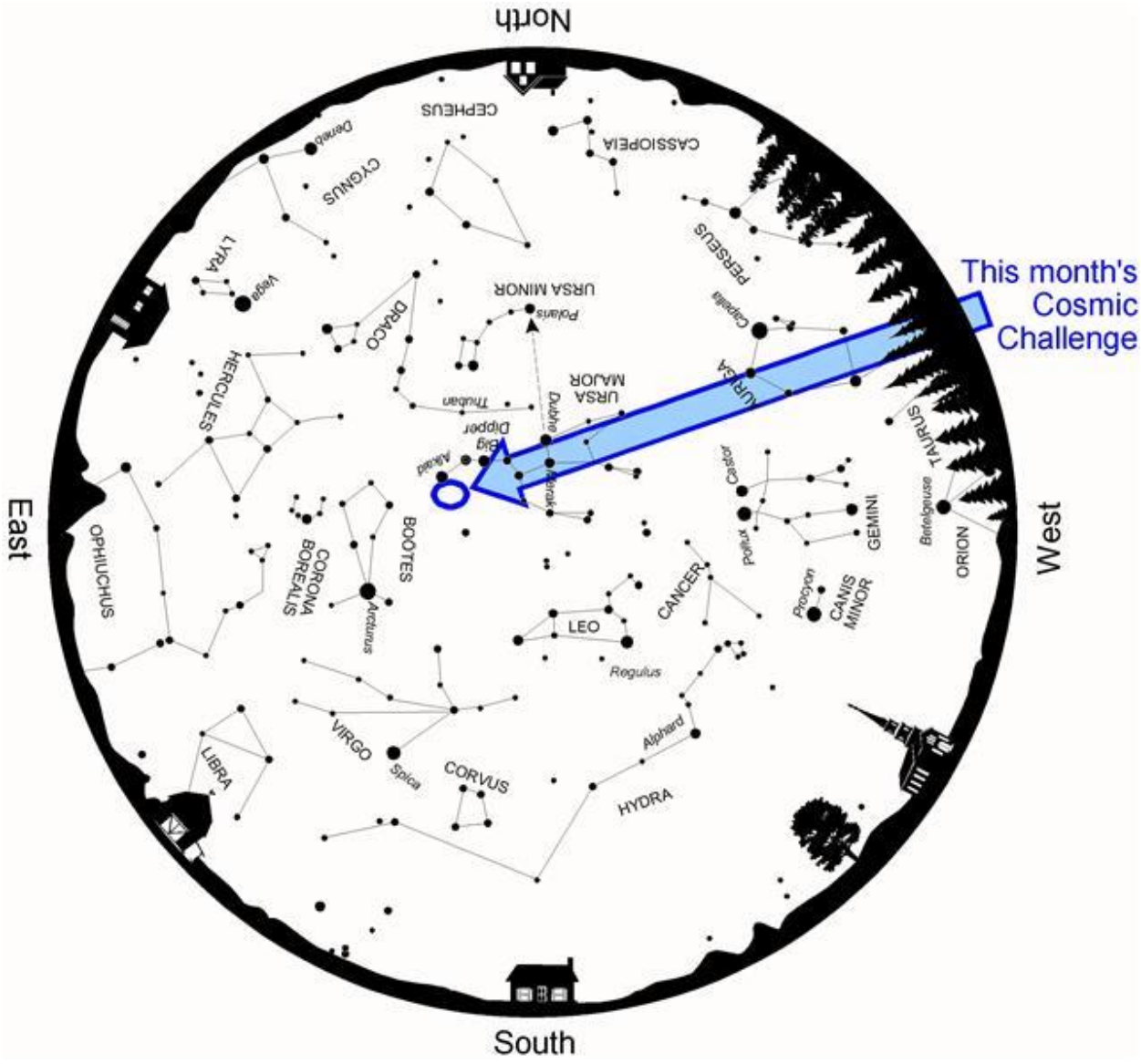
Cosmic Challenge: M51s spiral arms

May 2019

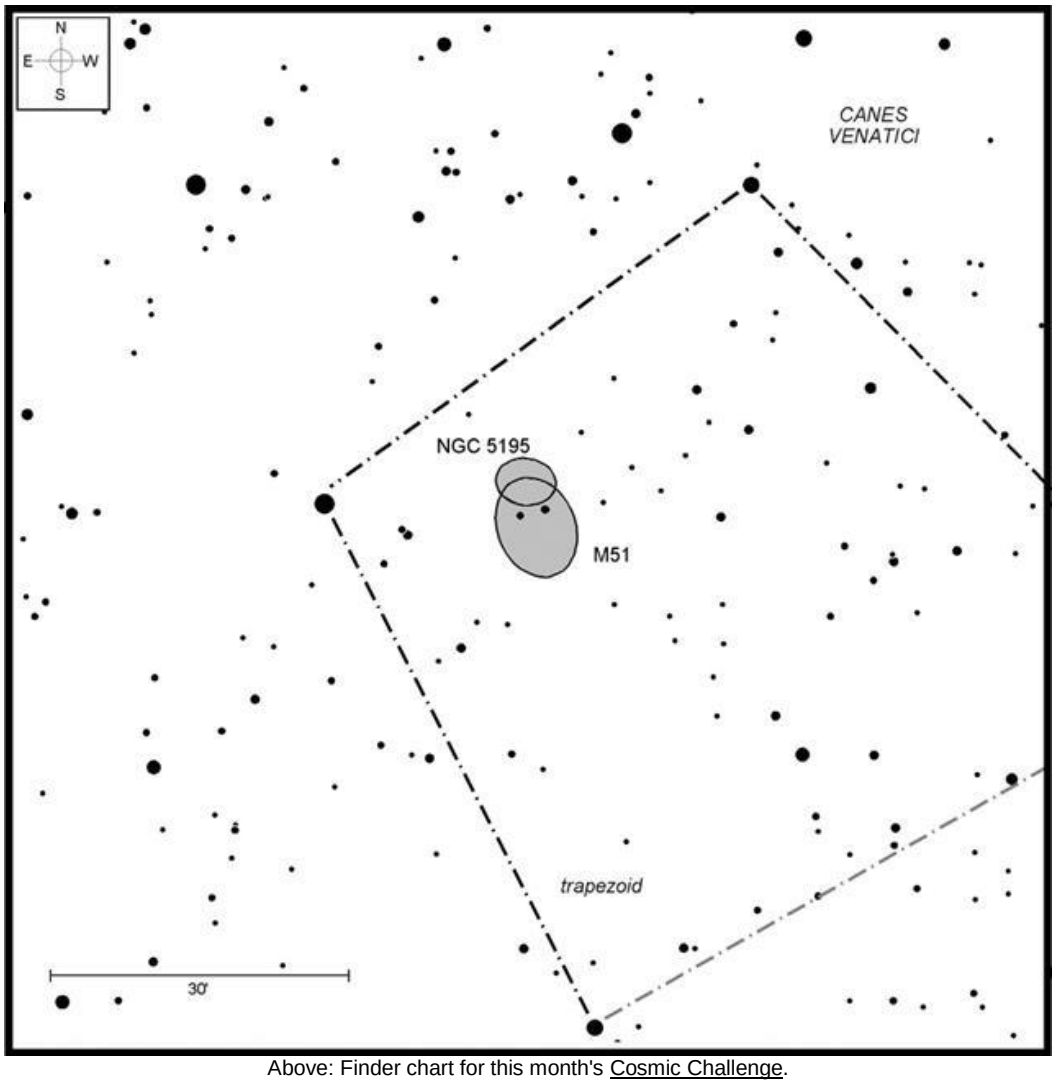
	6-inch (15 cm) to 9.25-inch (23 cm) telescopes

Target	Type	RA	DEC	Constellation	Magnitude	Size
M51 spiral arms	Galaxy structure	13h 29.9m	+47° 11.8'	Canes Venatici	8.4	10.3'x8.1'

Of the thousands of spiral galaxies visible through backyard telescopes, one stands above the rest in terms of visual interest: M51, the famous Whirlpool Galaxy in Canes Venatici. Everything adds up in M51's favor. We are seeing it very nearly face-on, its spiral arm halo is bright and peppered with star clouds and vast regions of nebulosity, and it brings with it a friend in the form of a smaller companion galaxy that can even be seen through giant binoculars.



Above: Spring star map. Credit: Map adapted from Star Watch by Phil Harrington

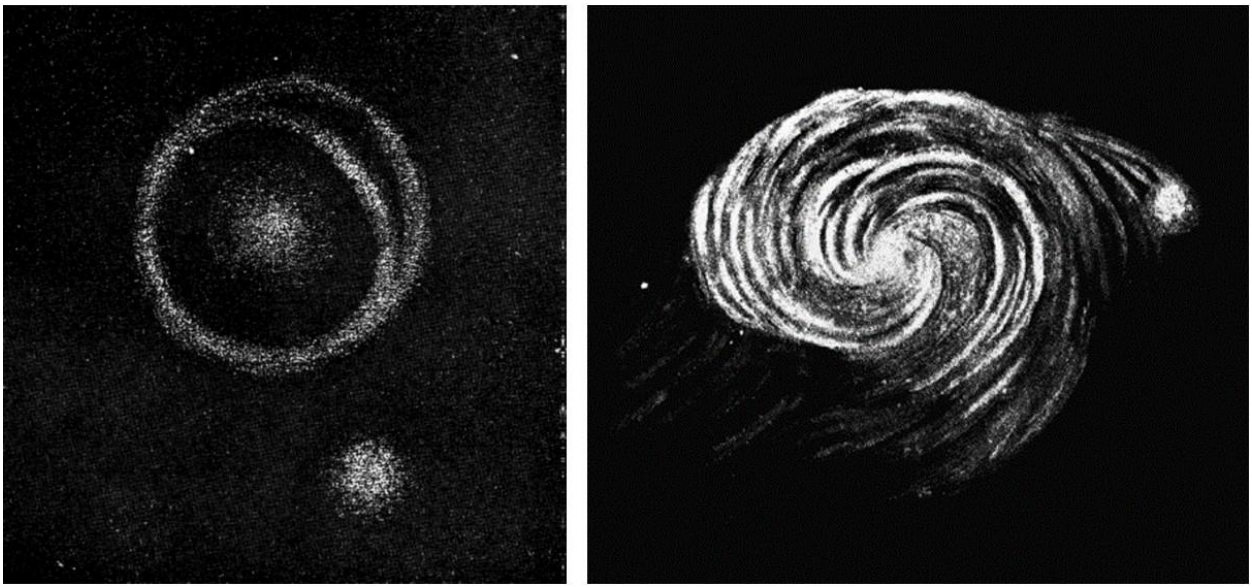


Above: Finder chart for this month's Cosmic Challenge.
Click on the chart to open a printable PDF version in a new window.

Charles Messier was first to lay eyes on the Whirlpool when he accidentally bumped into it on October 13, 1773. His notes recall a "very faint nebula without stars." The fact that he referred to it in the singular indicates that he saw only the bright core of M51 itself, and not its smaller companion, NGC 5195. The discovery of the latter is credited to Messier's friend and contemporary, Pierre Méchain, who noted a double core on March 21, 1781.

The first hint that there was more to see within M51 than just a pair of nebulous blobs came from an observation by John Herschel on April 26, 1830. Herschel recorded "a very bright round nucleus surrounded at a distance by a nebulous ring" through his 18.7-inch telescope. A later drawing by him recorded a large, bright core centered perfectly in a fainter surrounding ring. The companion, NGC 5195, is also shown as round, but smaller than M51's core and positioned outside of the mysterious ring. Herschel later mused:
Supposing it to consist of stars, the appearance it would present to a spectator placed on a planet attendant on one of them eccentrically situated towards the north preceding quarter of the central mass, would be exactly similar to that of our Milky Way, traversing in a manner precisely analogous the firmament of large stars, into which the central cluster would be seen projected, and (owing to its distance) appearing, like it, to consist of stars much smaller than those in other parts of the heavens. Can it, then, be that we have here a brother-system bearing a real physical resemblance and strong analogy of structure to our own?

Fifteen years later, in the spring of 1845, Herschel's puzzling nebulous ring was resolved into a pinwheel structure by Lord Rosse at Birr Castle in Ireland. Aiming toward it with his newly completed 72-inch "Leviathan" reflector, the largest telescope in the world at the time, Lord Rosse saw "spiral convolutions; with successive increase of optical power, the structure has become more complicated. The connection of the companion with the greater nebula is not to be doubted; the most conspicuous of the spiral class." Later, in 1861, Lord Rosse noted that "the outer nucleus unquestionably spiral with a twist to the left."



Left: John Herschel's rendition of M51 through his 18.7-inch reflector.
Right: Lord Rosse's view of M51 through his 72-inch Leviathan."

For an historical overview of the discovery of spiral structure in M51, I recommend reading The First Drawing of a Spiral Nebula by Michael Hoskin. His 1982 paper appeared in the *Journal for the History of Astronomy*, volume 13.

While discovering the spiral structure took a 72-inch aperture, knowing it's there gives you and me a distinct advantage. In fact, hints of M51's pinwheel construction have been reported through telescopes as small as 4 inches across, given extraordinary sky conditions and an exceptionally sharp-eyed observer. I find those reports absolutely amazing, since spotting the spiral structure through my own 8-inch reflector, even given dark skies, is a rare treat. The sketch below captures one of those moments. Before we discuss strategy, let's first zero in on M51. At 8th magnitude, M51 is bright enough to be visible through small binoculars even from suburbia. Start at Alkaid [Eta (η) Ursae Majoris], the end star in the handle of the Big Dipper. Hop to 24 Canum Venaticorum, a 4th-magnitude point just 2° to the west-southwest, then slide another 2° to the southwest to a trapezoid of faint stars. M51 lies inside the trapezoid's northeast corner.

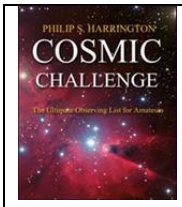
Above. M51 showing its spiral structure, as sketched through the author's 8-inch (20.3cm) reflector

M51 may be visible easily from suburban skies through 6- to 9.25-inch scopes, but sky darkness and transparency are the overriding factors when looking for its spiral structure. My first view of the spiral arms came in 1974 while observing through my venerable 8-inch f/7 Criterion RV-8 at the Stellafane amateur telescope makers convention in Springfield, Vermont. The sky was especially dark that year, with M33 visible without optical aid. With the same equipment under lesser conditions, however, I see no hint whatsoever. Indeed, from my suburban backyard, it takes my 18-inch reflector to make out any suggestion of the arms.

If this is your first time looking for the spiral arms, strategy is everything. First, choose the right magnification. The best views seem to come with eyepieces producing an exit pupil of between 2mm and 3mm. That narrow range seems to offer a good compromise between image size and contrast.

Next, you need to know how to look for the arms. Take a look at the glow surrounding the core of M51. It may look uniform at first, but careful study with averted vision will reveal some irregularities. One arm starts to the south of M51's core and hooks to the northeast, with the brightest portion lying halfway between the core and NGC 5195.

A second spiral arm begins just west of the core, curves to its south, and then spirals around toward the northeast. It fades from view as it extends toward NGC 5195. Using averted vision, can you also detect the faint nebulous bridge that reaches outward for the companion galaxy? Some observers report better success seeing the arms by focusing their attention on the dark gaps between them rather than looking for the bright arms themselves. By waiting for an especially dark, clear spring night and letting your gaze sweep across the faint glow of the Whirlpool's halo, perhaps tapping the telescope gently to vibrate the image, Lord Rosse's elusive "spiral convolutions" should be discernible.



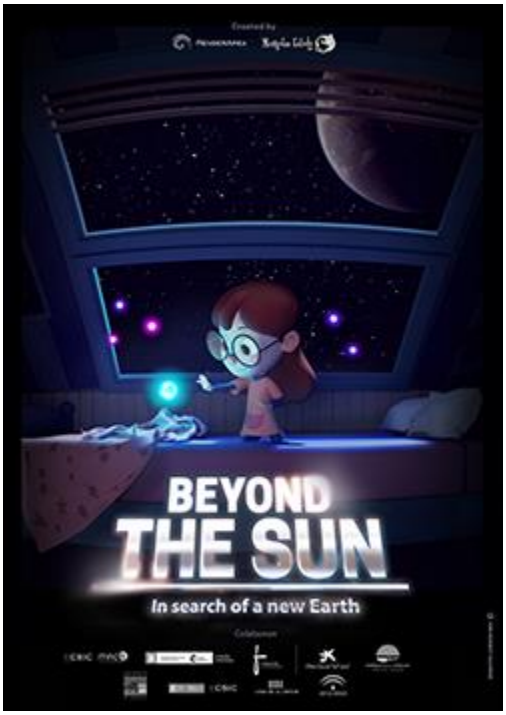
About the Author: Phil Harrington writes the monthly *Binocular Universe* column in Astronomy magazine and is the author of 9 books on astronomy. Visit his web site at www.philharrington.net to learn more.

Observatories and Planetarium

CSI Centennial Observatory / Faulkner Planetarium Herrett Center

Event	Place	Date	Time	Admission
International Astronomy Day Solar Viewing	Centennial Observatory	Saturday, May 11th, 2019	11:00 AM to 4:00 PM	FREE
International Astronomy Day Nighttime Telescope Viewing	Centennial Observatory	Saturday, May 11th, 2019	9:15 PM to midnight	FREE
Summer Solar Session #1	Centennial Observatory	Wednesday, May 29th, 2019	1:30 to 3:30 PM	FREE

College of Southern Idaho Campus Twin Falls, ID
Faulkner Planetarium / Show Times
http://herrett.csi.edu/astronomy/planetarium/showtimes.asp



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About the Magic Valley Astronomical Society

Magic Valley Astronomical Society
550 Sparks St.
Twin Falls, ID

The Magic Valley Astronomical Society (MVAS) was founded in 1976. The Society is a non-profit [501(c) 3] educational and scientific organization dedicated to bringing together people with an interest in astronomy.

In partnership with the Centennial Observatory, Herrett Center, College of Southern Idaho - Twin Falls; we hold regularly scheduled monthly meetings and observation sessions, at which we share information on current astronomical events, tools and techniques for observation, astrophotography, astronomical computer software, and other topics concerning general astronomy. Members enthusiastically share their telescopes and knowledge of the night sky with all who are interested. In addition to our monthly public star parties we hold members only star parties at various locations throughout the Magic Valley.

MVAS promotes the education of astronomy and the exploration of the night sky along with safe solar observing through our public outreach programs. We provide two types of outreach; public star parties and events open to anyone interested in astronomy, and outreach programs for individual groups and organizations (e.g. schools, churches, scout troops, company events, etc.), setting up at your location. All of our outreach programs are provided by MVAS volunteers at no cost. However, MVAS will gladly accept donations. Donations enable us to continue and improve our public outreach programs.

Membership is not just about personal benefits. Your membership dues support the work that the Magic Valley Astronomical Society does in the community to promote the enjoyment and science of astronomy.
Speakers, public star parties, classes and support for astronomy in schoolrooms, and outreach programs just to name a few of the programs that your membership dues support.

Annual Membership dues will be:
$20.00 for individuals, families, and $10.00 for students.
Contact Treasurer Jim Tubbs for dues information via e-mail: jtubbs015@msn.com

Donations to our club are always welcome and are even tax deductible. Please contact a board member for details.

Membership Benefits:
Lending Telescopes: The society currently has three telescopes for loan and would gladly accept others please contact President Robert Mayer, for more information on these and other benefits.

Telescopes are an individual thing and not practical for public use. However, everyone should have the experience of a good look at the moon for at least 5 minutes in their life time. It is a dimension and feeling that is unexplainable. Pictures or TV can't give this feeling, awareness, or experience of true dimension. A person will not forget seeing our closest neighbor, the moon. Norman Herrett in a letter to Dr. J. L. Taylor, president of the College of Southern Idaho, Twin Falls, ID, USA.