

May Celestial Calendar by Dave Mitsky

All times, unless otherwise noted, are UT (subtract four hours and, when appropriate, one calendar day for EDT)

- 5/1 May Day or Beltane, a cross-quarter day; Mars (heliocentric longitude 83.1 degrees) and Saturn (heliocentric longitude 263.1 degrees) are at heliocentric opposition at 7:00; the Moon is 9.7 degrees south of the first-magnitude star Pollux (Beta Geminorum) at 18:00
- 5/2 Mercury is stationary in right ascension at 14:00; the Moon is 3.3 degrees south of the bright open star cluster M44 (the Beehive Cluster or Praesepe) in Cancer at 18:00
- 5/3 First Quarter Moon occurs at 2:47; the Lunar X (also known as the Werner or Purbach Cross), an X-shaped illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to begin at 10:10
- 5/4 The Moon is 0.51 degree north-northeast of the first-magnitude star Regulus (Alpha Leonis), with an occultation occurring in New Zealand, Australia, southern New Guinea, Malaysia, and Indonesia, at 10:00; the Moon is at the ascending node (longitude 150.5°) at 10:44
- 5/5 The Martian vernal equinox occurs at 12:00; Mars (magnitude +1.6) is 6.2 degrees north of the first-magnitude star Aldebaran (Alpha Tauri) at 22:00
- 5/6 The peak of the Eta Aquarid meteor shower (20 per hour for northern hemisphere observers) occurs at 2:00; Mercury is at aphelion (0.4667 astronomical units from the Sun) at 14:00
- 5/7 Jupiter is 2.0 degrees south of the Moon at 21:00; Mercury is 2.0 degrees south of Uranus at 23:00
- 5/8 Asteroid 3 Juno is stationary in Aquila at 8:00
- 5/9 Venus is at descending node at 7:00
- 5/10 Full Moon, known as the Milk or Planting Moon, occurs at 21:43; Uranus (magnitude +5.9) is 0.65 degree south-southeast of the asteroid 20 Massalia (magnitude +11.7) at 22:00
- 5/12 A double Galilean satellite shadow transit begins at 1:59; the Moon is 9.5 degrees north of Antares at 13:00; the Moon is at apogee, subtending 29' 25" from a distance of 406,210 kilometers (252,407 miles), at 23:51
- 5/13 The equation of time equals 3.65 minutes at 22:00
- 5/14 The Sun enters Taurus (ecliptic longitude 53.45 degrees) at 1:00
- 5/15 A double Galilean satellite shadow transit begins at 14:56
- 5/17 Mercury is at greatest western elongation (26 degrees) at 23:00
- 5/19 Last Quarter Moon occurs at 0:34; a double Galilean satellite shadow transit begins at 3:54; the Curtiss Cross, an X-shaped illumination effect located between the craters Parry and Gambart, is predicted to be at a midpoint at 13:17
- 5/20 Neptune is 0.46 degree north of the Moon, with an occultation occurring in the Maldives, Madagascar, southern Africa, and the Falkland Islands, at 6:00
- 5/22 Venus is 2.3 degrees north-northwest of the Moon at 14:00; a double Galilean satellite shadow transit begins at 16:50
- 5/23 Uranus is 3.7 degrees north-northwest of the Moon at 7:00; asteroid 8 Flora is 0.25 degree north of the Moon at 11:00
- 5/24 Mercury is 1.5 degrees north-northwest of the Moon at 2:00
- 5/25 New Moon (lunation 1168) occurs at 19:45
- 5/26 The Moon is at perigee, subtending 33' 27" from a distance of 357,210 kilometers (221,958 miles), at 1:21; a double Galilean satellite shadow transit begins at 5:47; Mercury is at its greatest latitude south of the ecliptic plane (-7.0 degrees) at 20:00
- 5/27 Mars is 5.3 degrees north of the Moon at 3:00; the Moon is 5.0 degrees south of the bright open star cluster M35 in Gemini at 15:00
- 5/28 A double Galilean satellite shadow transit begins at 0:16
- 5/29 A double Galilean satellite shadow transit begins at 18:45

5/30 The Moon is 3.0 degrees south of M44 at 1:00

5/31 The Moon is at the ascending node (longitude 147.6 degrees) at 11:58; the Moon is 0.26 degree south of Regulus, with an occultation occurring in Mauritius, central and most of southern Africa, the Cape Verde Islands, and eastern Brazil, at 17:00

Nicolas Lacaille (1713-1762), Joseph Lockyer (1836-1920), Williamina Fleming (1857-1911), and Frank Drake (1930) were born this month.

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 Munkley observed Comet Halley on its first predicted return. The Italian astronomer Annibale de Gasparis discovered asteroid 14 Irene on May 19, 1851. 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 broad peak of the Eta Aquarid meteor shower centered on May 6th is compromised by a waxing gibbous Moon. Southern hemisphere observers are favored. The observing window for those living at 40 degrees north is 2.25 hours. Eta Aquarid meteors are debris from the famous periodic comet 1P/Halley. See <http://www.imo.net/2017-eta-aquariids-predictions-and-observations/> for additional information.

Information on Iridium flares and passes of the ISS, the Tiangong-1, the Tiangong-2, the USAF's X-37B, the HST, and other satellites can be found at <http://www.heavens-above.com/>

The Moon is 4.5 days old, is illuminated 27.0%, subtends 32.9 arc minutes, and is located in Gemini on May 1st at 0:00 UT. The Moon is at its greatest northern declination on May 28th (+19.4 degrees). The Moon is at its greatest its greatest southern declination on May 15th (-19.3 degrees). Longitudinal libration is at maximum (+6.8 degrees) on May 4th and at minimum (-7.9 degrees) on May 20th. Latitudinal libration is at maximum (+6.5 degrees) on May 25th and at minimum (-6.6 degrees) on May 12th. New Moon occurs on May 25th. The year's shortest lunar month, lasting 29 days 6 hours and 46 minutes, begins on that day. Large tides will take place for a few days after New Moon. The Moon occults Regulus twice this month from certain parts of the world. Consult <http://www.lunar-occultations.com/iota/bstar/0504zc1487.htm> and <http://www.lunar-occultations.com/iota/bstar/0531zc1487.htm> for more on these events. Visit <http://saberdoesthestars.wordpress.com/2011/07/05/saber-does-the-stars/> for tips on spotting extreme crescent Moons. 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>

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 +2.5, 11.2", 10% illuminated, 0.60 a.u., Pisces), Venus (magnitude -4.7, 37.8", 27% illuminated, 0.44 a.u., Pisces), Mars (magnitude +1.6, 3.9", 98% illuminated, 2.40 a.u., Taurus), Jupiter (magnitude -2.4, 43.5", 100% illuminated, 4.53 a.u., Virgo), Saturn (magnitude +0.3, 17.8", 100% illuminated, 9.34 a.u., Sagittarius), Uranus on May 16th (magnitude +5.9, 3.4", 100% illuminated, 20.80 a.u., Pisces), Neptune on May 16th (magnitude +7.9, 2.3", 100%

illuminated, 30.26 a.u., Aquarius), and Pluto on May 16th (magnitude +14.2, 0.1", 100% illuminated, 32.72 a.u., Sagittarius).

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

Mercury, Venus, and Uranus are all located in Pisces as May begins.

Mercury is stationary on May 2nd, is at aphelion on May 6th, is at greatest western elongation on May 17th, and is at greatest heliocentric latitude south on May 26th. The speediest planet will be low in the eastern sky prior to sunrise for northern hemisphere observers and will be more easily visible at the end of the month, when it brightens to magnitude -0.3.

During May, Venus shines prominently in the dawn sky. It decreases in angular diameter from 37.8 arc minutes to 24.8 arc minutes but increases in illumination from 27% to 48% during the course of the month. As the sun rises in late May, Venus will reach an altitude of about 23 degrees for observers at 40 degrees north. The brightest planet is at the descending node on May 9th. On May 22nd, Venus lies 2.3 degrees north-northwest of the Moon in the morning sky.

May is the last month of this year when Mars will be visible. It subtends a mere three arc seconds and shines approximately one half-magnitude fainter than the class K5 giant star Aldebaran this month. The Red Planet passes some six degrees north of Aldebaran between May 5th and May 7th and lies about the same distance to the upper right of a young crescent Moon on the evening of May 26th.

Jupiter decreases in brightness from magnitude -2.4 to magnitude -2.3 and shrinks in angular diameter from 43.5 arc seconds to 40.8 arc seconds during May. Jupiter culminates after 11:00 p.m. local daylight time on May 1st and just after 9:00 p.m. local daylight time on May 31st. The largest gas giant continues to retrograde through Virgo, heading towards the binary star Porrima (Gamma Virginis). On the night of May 9th/May 10th between 1:00 and 1:30 a.m. EDT, Ganymede, Io, and Callisto form a straight line at angle of approximately 40 degrees to the equator of the planet. Earlier that night Ganymede exits from eclipse by Jupiter's shadow at 10:55 p.m. EDT and Europa is occulted at 11:45 p.m. EDT. In the early morning, Io begins to transit Jupiter at 2:47 a.m. EDT and its shadow follows at 3:30 a.m. EDT. At 3:36 a.m. EDT, Europa emerges from eclipse. Io's transit ends at 4:58 a.m. EDT and its shadow departs Jupiter's disk at 5:41 a.m. EDT, ending an eventful night of satellite events. Double Galilean satellite shadow transits take place on May 12th, May 15th, May 19th, May 22nd, May 26th, May 28th, and May 29th. The ones occurring on May 12th, May 19th, May 26th, and May 28th are of interest to observers in eastern North America. 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 Great Red Spot (GRS). GRS transit information also appears on pages 50 and 51 of the May 2017 issue of *Sky & Telescope*. Data on the Galilean satellite events is available on page 51 of the May 2017 issue of *Sky & Telescope* and online at <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/> and <http://www.projectpluto.com/jevent.htm>

At mid-month, Saturn shines at magnitude +0.2 and has an apparent equatorial diameter of 18.1 arc seconds. Its rings are inclined by 26 degrees and subtend 41 arc seconds. In early May, Saturn transits the meridian at about 4:00 a.m. It lies about five degrees to the west of M20 (the Trifid Nebula) and the open star cluster M21 and five degrees southwest of the open star cluster M23. The Ringed Planet's retrograde motion causes it to depart Sagittarius and enter Ophiuchus on May 18th. Eighth-magnitude Titan is positioned north of the planet on May 7th and May 23rd and south of it on May 15th and May 31st. Saturn's variably bright moon Iapetus shines at tenth magnitude when it is located nine arc minutes

from Saturn at greatest western elongation on May 9th. As it passes two arc minutes north of Saturn on May 29th, Iapetus drops in brightness to eleventh magnitude, since its dark hemisphere is then facing Earthward. For further information on Saturn's satellites, browse <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/>

Uranus is lost in morning twilight until late May. On the morning of May 31st, Venus and Uranus are separated by about three degrees.

Neptune passes nine arc minutes south of the sixth-magnitude star 81 Aquarii, which is located 2.2 degrees east-northeast of the fourth-magnitude star Lambda Aquarii, on May 14th. Neptune lies within 20 arc minutes of 81 Aquarii for the entire month.

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

For more on the planets and how to locate them, browse <http://www.nakedeyeplanets.com/>

Comet 41P/Tuttle–Giacobini–Kresák heads southward through Hercules and Lyra in May. The periodic comet passes very close to the fourth-magnitude star Kappa Lyrae on May 4th. Comet C/2015 V2 (Johnson) slides southward through eastern Boötes. Comet C/2015 ER61 (PanSTARRS) passes northwestward through Aquarius and Pisces this month. Visit <http://cometchasing.skyhound.com/> and <http://www.aerith.net/comet/weekly/current.html> for information on these and other comets visible this month.

Asteroid 4 Vesta travels southeastward through Cancer this month. The eighth-magnitude minor planet passes just north of the sixth-magnitude star Lambda Cancri on April 8th and April 9th, just south of the sixth-magnitude star Upsilon Cancri on April 16th, and a few degrees north of the bright open cluster M44 on April 21st. Asteroids brighter than magnitude +11.0 that reach opposition this month include 30 Urania on May 6th, 52 Europa on May 12th, 196 Philomela on May 16th, and 27 Euterpe on May 25th. Information on asteroid occultations taking place this month is available at http://www.asteroidoccultation.com/2017_05_si.htm

A wealth of information on solar system celestial bodies is posted at <http://nineplanets.org/>

A free star map for May 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 May 2nd, 5th, 8th, 11th, 14th, 17th, 20th, 22nd, 25th, 28th, and 31st. For more on Algol, see <http://stars.astro.illinois.edu/sow/Algol.html> and <http://www.solstation.com/stars2/algol3.htm>

Information pertaining to observing some of the more prominent Messier galaxies can be found at <http://www.cloudynights.com/topic/358295-how-to-locate-some-of-the-major-messier-galaxies-and-helpful-advice-for-novice-amateur-astronomers/>

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

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)

Notable carbon star for May: SS Virginis

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.