August 2019 Astronomy Calendar by Dave Mitsky
Some information supplied and/or added by Tony Donnangelo

All times are Daylight Saving Time (-4 hrs. U.T.).

Events listed are based on a location of 40°N in the Eastern US and may not be visible in all areas.

Concerning moderate and minor meteor shower activity:
Do not have any high expectations. This general information is to account for why you might be seeing a few more than normal meteors during your observing session.

Lunar light rays may occur prior to or after the predicted time. Initial observations might have occurred after the ray’s inception or continued after the observer’s session. Rays may last a very short time or for many hours. Obtain further information; send reports (including non-occurrences and miss-calculations), photos, and observations of new rays to:

7/31 The Moon, Venus, and the bright open cluster M44 (the Beehive Cluster or Praesepe) in Cancer lie within a circle having a diameter of 2.7° at 9:00 p.m.
7/31 The Moon is 0.6° northeast of M44 at 10:00 p.m.
7/31 New Moon (lunation 1195) occurs at 11:12 p.m.
8/1 Comet 234P/LINEAR is at opposition at 3.262 A.U.
8/1 Comet C/2017 U7 is at opposition at 5.493 A.U.
8/1 Apollo asteroid 2012 DT32 near-Earth flyby at 0.083 A.U.
8/1 Mercury is stationary in longitude, with direct (eastward) motion to begin, at 12:00 a.m.
8/1 The Moon is 1.6° north of Mars at 5:00 p.m.
8/1 Alpha Capricornids meteor shower (moderate activity) peaks 1/2. Duration is from 7/15 to 9/11. Observing and history: http://meteorshowersonline.com/showers/alpha_capricornids.html
8/2 Comet P/2006 F4 (Spacewatch) is at perihelion at 2.334 A.U.
8/2 Comet C/2017 U7 is at closest approach to Earth at 5.493 A.U.
8/2 The Moon is at perigee, subtending 33’ 15’’ from a distance of 359,398 kilometers (223,320 miles), at 3:11 a.m.
8/2 Mount Carleton Star Party being held through the 3rd at Mount Carleton Provincial Park, Canada
8/2 The Moon is 3.1° north-northeast of the first-magnitude star Regulus (Alpha Leonis) at 10:00 a.m.
8/3 Comet 366P/Spacewatch is at closest approach to Earth at 2.234 A.U.
8/3 Asteroid (439) Ohio is at closest approach to Earth at 2.335 A.U.
8/3 Venus is 0.3° south of M44 at 3:00 a.m.
8/4 Comet 110P/Hartley is at opposition at 3.330 A.U.
8/4 Comet P/2018 H2 (PANSTARRS) is at opposition at 3.414 A.U.
8/5 50th Anniversary (1969) of Mariner 7 Mars flyby.
8/5 Comet 168P/Hergenrother is at perihelion at 1.359 A.U.
8/5 Comet 163P/NEAT is at perihelion at 2.067 A.U.
8/5 Comet 264P/Larsen is at perihelion at 2.438 A.U.
8/6 Asteroid (16) Psyche (magnitude +9.3) is at opposition at 12:00 a.m.
8/6 The Moon is 7.3° north-northeast of the 1st magnitude star Spica (Alpha Virginis) at 2:00 a.m.
8/6 Southern Iota Aquarids meteor shower (moderate activity) peaks 6/7. Duration is from 7/1 to 9/18. Observing and history: http://meteorshowersonline.com/showers/iota_aquarids.html
8/7 Comet 210P/Christensen is at closest approach to Earth at 2.280 A.U.
8/7 The astronomical cross-quarter day known as Lammas or Lughnasadh occurs today.
8/7 Gemma Frisius (sunrise) lunar light ray predicted to occur at 11:47:37 p.m. Moonset at 12:32 a.m.
8/7 First Quarter Moon occurs at 1:31 p.m.
The Lunar X, also known as the Werner or Purbach Cross, an X-shaped clair-obscur illumination effect involving various ridges and crater rims located between the craters La Caille, Blanchinus, and Purbach, is predicted to begin at 11:43 p.m. on 8/7.

Mercury is 9.1° south of the first-magnitude star Pollux (Beta Geminorum) at 1:00 a.m. on 8/8.

Venus is at perihelion (a distance of 0.7185 astronomical units from the Sun) at 5:00 a.m. on 8/8.

Pluto (sunrise) lunar light ray predicted to occur at 10:45:57 p.m. on 8/8.

Upsilon Pegasids meteor shower (minor activity) peaks 8/9. Duration is from 7/25 to 8/19.


Comet P/2006 W1 (Gibbs) is at closest approach to Earth at 2.053 A.U. on 8/9.

Comet C/2018 V2 (ATLAS) is at closest approach to Earth at 2.601 A.U. on 8/9.

Comet C/2018 EN4 (NEOWISE) is at opposition at 4.050 A.U. on 8/9.

15th Anniversary (2004) of Franck Marchis' discovery of Remus, a moon of asteroid (87) Sylvia. Jonathan Lane's 200th birthday (1819). The Moon is 7.7° north-northeast of the 1st magnitude star Antares (Alpha Scorpii) at 1:00 p.m. on 8/9.

The Moon is 2.0° south of Jupiter at 7:00 p.m. on 8/9.

Mercury is at greatest western elongation (19.0°) at 7:00 p.m. on 8/9.

Reinhold (sunrise) lunar light ray predicted to occur at 9:57:36 p.m. on 8/9.

Cichus A (sunrise) lunar light ray predicted to occur at 11:21:09 p.m. on 8/9.

Copernicus (sunrise) lunar light ray predicted to occur at 11:47:41 p.m. on 8/9.

Griffith Observatory Public Star Party being held in Los Angeles, California. The Sun enters Leo, at longitude 138.2° on the ecliptic, at 11:00 p.m. on 8/10.

The Moon is 0.04° south of Saturn, with an occultation taking place in most of Polynesia, Melanesia, northern New Zealand, most of Australia, and eastern Indonesia, at 6:00 a.m. on 8/12.

The Moon is 0.1° north of Pluto, with an occultation taking place in the southern Arabian Peninsula, central and eastern Africa, Ascension Island, and northeastern South America, at 6:00 p.m. on 8/12.

Uranus is stationary in right ascension, with retrograde (western) motion to begin, at 2:00 a.m. on 8/12.

The Moon is 0.04° south of Saturn, with an occultation taking place in most of Polynesia, Melanesia, northern New Zealand, most of Australia, and eastern Indonesia, at 6:00 a.m. on 8/12.

The Moon is at the descending node (longitude 287.4°) at 11:00 a.m. on 8/12.

Jupiter is 6.7° northeast of Antares at 1:00 p.m. on 8/12.

The Moon is 0.1° north of Pluto, with an occultation taking place in the southern Arabian Peninsula, central and eastern Africa, Ascension Island, and northeastern South America, at 6:00 p.m. on 8/13.

Comet P/2002 S7 (SOHO) is at closest approach to Earth at 2.081 A.U. on 8/13.

Anders Angstrom's 205th birthday (1814).

Asteroid (15) Eunomia (magnitude +8.2) is at opposition at 2:00 a.m. on 8/13.

Perseids meteor shower (major activity - a zenithal hourly rate of 150 or more per hour) peaks at 3:00 a.m. on 8/13. Duration is from 7/23 to 8/22. Observing and history: [http://meteorshowersonline.com/perseids.html](http://meteorshowersonline.com/perseids.html)

Phocylides (sunrise) lunar light ray predicted to occur at 10:52:03 p.m. on 8/13.

Alpha Ursa Majorids meteor shower (minor activity) peaks at 3:00 a.m. on 8/13. Duration is from the 9th to 10th. Observing and history: [http://meteorshowersonline.com/showers/alpha_ursa_majorids.html](http://meteorshowersonline.com/showers/alpha_ursa_majorids.html)

Northern Delta Aquarids meteor shower (moderate activity) peaks at 3:00 a.m. on 8/13. Duration is from 7/16 to 9/10. Observing and history: [http://meteorshowersonline.com/showers/delta_aquarids.html](http://meteorshowersonline.com/showers/delta_aquarids.html)

Venus is in superior conjunction with the Sun (1.731 astronomical units) at 2:00 a.m. on 8/14.

Venus is at its brightest (magnitude -3.9) at 8:00 a.m. on 8/15.

Full Moon (known as the Fruit, Grain, Green Corn, or Sturgeon Moon) occurs at 8:29 a.m. on 8/15.

Mercury is at the ascending node through the ecliptic plane at 11:00 a.m. on 8/16.

Comet 79P/du Toit-Hartley is at closest approach to Earth at 2.322 A.U. on 8/16.

Comet 367P/Catalina is at closest approach to Earth at 2.320 A.U. on 8/16.

Asteroid (16) Psyche is at closest approach to Earth at 1.701 A.U. on 8/16.

Schelner (sunrise) lunar light ray predicted to occur at 12:19:41 a.m. on 8/16.

Jupiter is stationary in right ascension, with direct (eastern) motion to begin, at 12:00 p.m. on 8/16.

Alpha Eridanids meteor shower (minor activity) peaks at 3:00 a.m. on 8/16. Duration is from 7/23 to 8/22. Observing and history: [http://meteorshowersonline.com/perseids.html](http://meteorshowersonline.com/perseids.html)

Phocylides (sunrise) lunar light ray predicted to occur at 10:52:03 p.m. on 8/16.

Alpha Ursa Majorids meteor shower (minor activity) peaks at 3:00 a.m. on 8/16. Duration is from the 9th to 30th. Observing and history: [http://meteorshowersonline.com/showers/alpha_ursa_majorids.html](http://meteorshowersonline.com/showers/alpha_ursa_majorids.html)

Northern Delta Aquarids meteor shower (moderate activity) peaks at 3:00 a.m. on 8/16. Duration is from 7/16 to 9/10. Observing and history: [http://meteorshowersonline.com/showers/delta_aquarids.html](http://meteorshowersonline.com/showers/delta_aquarids.html)

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Full Moon (known as the Fruit, Grain, Green Corn, or Sturgeon Moon) occurs at 8:29 a.m. on 8/15.

Mercury is at the ascending node through the ecliptic plane at 11:00 a.m. on 8/16.
8/16 Comet C/2018 R5 (Lemmon) is at closest approach to Earth at 3.325 A.U.
8/16 Pierre Mechain's 275th birthday (1744).
8/16 Asteroid (39) Laetitia (magnitude +9.1) is at opposition at 11:00 p.m.
8/17 Comet 112P/Urata-Niijima is at opposition at 1.394 A.U.
8/17 Comet P/2012 K3 (Gibbs) is at perihelion at 2.089 A.U.
8/17 The Moon is at apogee, subtending 29' 25'' from a distance of 406,244 kilometers (252,429 miles), at 6:49 a.m.
8/17 Mercury is 0.9° south of M44 at 7:00 a.m.
8/17 The Moon is 3.5° southeast of Neptune at 1:00 p.m.
8/18 Comet 25D/Neujmin is at opposition at 1.394 A.U.
8/18 Comet 112P/Urata-Niijima is at opposition at 1.394 A.U.
8/18 Endymion (sunset) lunar light ray predicted to occur at 2:28:23 a.m.
8/18 Mars is 0.7° north-northeast of Regulus at 5:00 a.m.
8/18 Kappa Cygnids meteor shower (moderate activity) peaks on the 18th. Duration is from 7/26 to 9/1. Observing and history: [http://meteorshowersonline.com/showers/kappa_cygnids.html](http://meteorshowersonline.com/showers/kappa_cygnids.html)
8/19 Comet C/2018 F1 (Grauer) is at opposition at 3.074 A.U.
8/19 Comet C/2018 C2 (Lemmon) is at opposition at 4.285 A.U.
8/19 Willard Boyle's 95th birthday (1924).
8/20 Comet P/2015 X6 (PANSTARRS) is at opposition at 1.836 A.U.
8/20 Comet C/2017 B3 (LINEAR) is at closest approach to Earth at 3.480 A.U.
8/20 Jons Berzelius' 240th birthday (1779).
8/20 Mercury is at perihelion (a distance of 0.3075 astronomical units from the Sun) at 3:00 a.m.
8/21 Comet P/2008 Y12 (SOHO) is at closest approach to Earth at 0.620 A.U.
8/21 Comet 3P/Halley is at opposition at 2.330 A.U.
8/21 Venus, Mars, and Regulus lie within a circle with a diameter of 2.1° at 5:00 a.m.
8/21 Venus is 0.9° north-northeast of Regulus at 7:00 a.m.
8/21 The Moon is 4.4° southeast of Uranus at 3:00 p.m.
8/22 Comet 52P/Harrington-Abell is at opposition at 4.069 A.U.
8/22 Samuel Langley's 185th birthday (1834).
8/22 Egede (sunset) lunar light ray predicted to occur at 2:13:03 a.m.
8/22 Asteroid (4) Juno is in conjunction with the Sun at 6:00 p.m.
8/22 Ptolemaeus (sunset) lunar light ray predicted to occur at 11:29:30 p.m. Moonrise 11:43 pm.
8/23 Last Quarter Moon occurs at 10:56 a.m.
8/23 The Moon is 7.8° southeast of the bright open cluster M45 (the Pleiades or Subaru) at 1:00 p.m.
8/24 Comet P/2013 TL117 is at opposition at 3.404 A.U.
8/24 Comet 94P/Russell is at opposition at 3.716 A.U.
8/24 The Curtiss Cross, an X-shaped clair-obscur illumination effect located between the craters Parry and Gambart, is predicted to be visible at 12:36 a.m.
8/24 The Moon is 2.4° north of the first-magnitude star Aldebaran (Alpha Taurii) at 6:00 a.m.
8/24 Merritt Summer Star Quest being held through the 31st in Vancouver, Canada.
8/24 Venus is 0.3° north-northeast of Mars at 2:00 p.m.
8/25 Comet P/2015 X6 (PANSTARRS) is at closest approach to Earth at 1.833 A.U.
8/25 Comet 180P/NEAT is at opposition at 3.957 A.U.
8/25 Vincenzo Silvano Casulli's 75th birthday (1944).
8/25 Ron Greeley's 80th birthday (1939).
8/25 Mars is at aphelion (1.6661 astronomical units from the sun) at 9:00 p.m.
8/25 The Moon is 2.2° south of the bright open cluster M35 in Gemini at 10:00 p.m.
8/26 The Moon is at the ascending node (longitude 106.7°) at 10:00 p.m.
8/27 Comet 36P/Whipple is at closest approach to Earth at 2.325 A.U.
8/27 The Moon is 9.7° south of the first-magnitude star Castor (Alpha Geminorum) at 6:00 a.m.
8/27 The Moon is 6.1° south of Pollux at 11:00 a.m.
8/28 Comet 105P/Singer Brewster is at closest approach to Earth at 2.284 A.U.
8/28 230th anniversary (1789) of William Herschel's discovery of Saturn's moon, Enceladus.
8/28 The Moon is 0.3° north of M44 at 8:00 a.m.
8/29 Mercury is 1.3° north-northeast of Regulus at 5:00 a.m.
8/29 The Moon, Mercury and Regulus lie within a circle having a diameter of 3.1° at 8:00 p.m.
8/29 The Moon is 3.1° north-northeast of regulus at 9:00 p.m.
8/29 Venus is at its northernmost latitude from the ecliptic plane (3.4°) at 9:00 p.m.
8/29 The Moon is 1.9° north-northeast of Mercury at 11:00 p.m.
8/30 Comet 26P/Grigg-Skjellerup is at closest approach to Earth at 2.402 A.U.
8/30 40th Anniversary (1979) of the first observation of a comet collision with the Sun – Comet Howard-Koomen-Michels with SOLWIND I.
8/30 New Moon (lunation 1196) occurs at 6:37 a.m.
8/30 The Moon, Mercury and Mars lie within a circle having a diameter of 5.6° at 7:00 a.m.
8/30 Mercury is at its northernmost latitude from the ecliptic plane (7.0°) at 8:00 a.m.
8/30 Fundy Park Stargaze being held through the 31st at Fundy National Park, Canada.
8/30 The Moon, Venus, and Mars lie within a circle having a diameter of 4.00° at 10:00 a.m.
8/30 Spruce Woods Star Party being held through Sept. 2 at Spruce Woods Provincial Park, Canada.
8/30 The Moon is 2.9° north-northeast of Mars at 11:00 a.m.
8/30 The Moon is at perigee, subtending 33° 28'' from a distance of 357,176 kilometers (221,939 miles), at 11:53 a.m.
8/30 The Moon is 2.8° north-northeast of Venus at 3:00 p.m.
8/31 Comet C/2018 R5 (Lemmon) is at opposition at 3.360 A.U.
8/31 Asteroid (130) Elektra, with it's two moons, is at closest approach to Earth at 1.615 A.U.

John Flamsteed, Christian Mayer, Pierre François André Méchain, Maria Mitchell, and Otto Struve were born this month.

The gibbous phase of Mars was first observed by Francesco Fontana on August 24, 1638. Abraham Ihle discovered the globular cluster M22 on August 26, 1665. Nicolas Sarabat discovered Comet C/1729 P1 (Sarabat) on August 1, 1729. Caroline Herschel discovered Comet C/1786 P1 (Herschel) on August 1, 1786. The Saturnian satellite Enceladus was discovered by William Herschel on August 28, 1789. Dominique Dumouchel was the first person to observe the return of Comet 1P/Halley on August 5, 1835. John Russell Hind discovered asteroid 7 Iris on August 13, 1847. Asaph Hall discovered Deimos on August 11, 1877 and Phobos on August 17, 1877. The first extragalactic supernova, S Andromedae, was discovered by Ernst Hartwig on August 20, 1885. David Jewitt and Jane Luu discovered the trans-Neptunian object (15760) 1992 QB1 on August 30, 1992. The Jovian satellite 2002 Laomedea was discovered by Matthew Holman on August 13th, 2002.

The peak of the Perseid meteor shower takes place on the night of August 12th/August 13th and is severely compromised by moonlight from a 95%-illuminated waxing gibbous Moon. Perhaps a dozen Perseids an hour may be visible during the peak. Comet 109P/Swift-Tuttle is the source of Perseid meteors. The shower’s radiant is just to the southeast of the Double Cluster (NGC 869 and NGC 884). For more on this year’s Perseids, see page 50 of the August 2019 issue of Sky & Telescope or click on https://earthsky.org/astronomy-essentials/everything-you-need-to-know-perseid-meteor-shower

Information on passes of the ISS, the USAF’s X-37B, the HST, and other satellites can be found at http://www.heavens-above.com/

The Moon is 29.3 days old, is illuminated 0%, subtends 33.1 arc minutes, and is located in Cancer on August 1st at 0:00 UT. The Moon is at its greatest northern declination on August 27th (+22.4 degrees) and its greatest southern declination on August 12th (-22.4 degrees). Longitudinal libration is at a maximum of +7.2 degrees on August 9th and a minimum of -7.3 degrees on August 25th. Latitudinal libration is at a maximum of +6.8 degrees on August 25th and a minimum of -6.7
degrees on August 6th. The Moon is at perigee (at a distance of 56.35 Earth-radii) on August 2nd and again (at a distance of 56.00 Earth-radii) on August 17th. New Moon (i.e., the dark of the Moon) occurs on August 1st and August 30th. Large tides will take place following New Moon on August 30th. The waxing gibbous Moon occults Saturn and Pluto on August 12th from certain parts of the world. The waning crescent Moon occults the third-magnitude star Zeta Tauri on the morning of August 25th. The event is visible from the western continental United States and Mexico. For more on this occultation, see page 50 of the August 2019 issue of Sky & Telescope. Browse http://www.lunar-occultations.com/iota/bstar/bstar.htm for information on upcoming lunar occultations. Visit http://saberdoesthestars.wordpress.com/2011/07/05/saber-does-the-stars/ for tips on spotting extreme crescent Moons. Click on https://www.calendar-12.com/moon_calendar/2019/august for a lunar phase calendar for this month. Times and dates for the lunar crater light rays predicted to occur in August are available at http://www.lunar-occultations.com/rlo/rays/rays.htm

The Sun is located in Cancer on August 1st. It enters the constellation of Leo on August 11th and achieves an ecliptic longitude of 150 degrees on August 23rd.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on August 1: Mercury (magnitude +2.0, 9.7", 13% illuminated, 0.70 a.u., Gemini), Venus (magnitude -3.9, 9.7", 100% illuminated, 1.73 a.u., Cancer), Mars (magnitude +1.8, 3.5", 100% illuminated, 2.65 a.u., Leo), Jupiter (magnitude -2.4, 42.7", 99% illuminated, 4.62 a.u., Ophiuchus), Saturn (magnitude +0.2, 18.3", 100% illuminated, 9.11 a.u., Sagittarius), Uranus (magnitude +5.8, 3.6", 100% illuminated, 19.53 a.u. on August 16th, Aries), Neptune (magnitude +7.8, 2.4", 100% illuminated, 29.02 a.u. on August 16th, Aquarius), and Pluto (magnitude +14.2, 0.1", 100% illuminated, 33.00 a.u. on August 16th, Sagittarius).

This month Jupiter is visible in the south and Saturn in the southeast. At midnight, Jupiter and Saturn can be found in the southwest, Uranus in the east, and Neptune in the southeast. In the morning, Mercury is in the east, Uranus is in the south, and Neptune is in the southwest.

Mercury undergoes one of its best morning appearances of the year beginning at the middle of August. The speediest planet reaches its greatest heliocentric latitude south and is inferior conjunction on August 9th. The speediest planet is stationary on August 1st, reaches a greatest western elongation of 19 degrees on August 9th, and is at the ascending node on August 15th. It is at perihelion on August 20th and is at its greatest heliocentric latitude north on August 30th. The New Moon passes two degrees north-northeast of Mercury on August 30th.

Venus is lost in the glare of the Sun this month. It’s in superior conjunction with the Sun at ecliptic latitude 3.1 degrees on August 14th. On that date, Venus is 1.731 a.u. from the Earth. The brightest planet attains its greatest heliocentric latitude north on August 30th.

Mars is also too close to the Sun to be seen during August.

Jupiter sets around midnight local daylight-saving time by the end of the month. It decreases in brightness from magnitude -2.4 to magnitude -2.2 and diminishes in angular diameter from 42.7 to 39.1 arc seconds during August. Jupiter reaches its second stationary point on August 11th. At midnight, the gas giant is situated approximately seven degrees from Antares. The waxing gibbous Moon passes two degrees south of Jupiter on August 9th. Jupiter passes very close to the tenth-magnitude globular cluster NGC 6235 from August 25th through August 27th. The four Galilean satellites are positioned in order of increasing distance from the planet on August 20th. Callisto, the outermost of the Galilean satellites, is located south of the planet on the night of August 16th/17th. Information on Great Red Spot transit times and Galilean satellite events is available on pages 50 and 51 of the August 2019 issue of Sky & Telescope and online at http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/ and https://www.projectpluto.com/jevent.htm
Saturn transits around 11:30 p.m. local daylight-saving time as August begins. The Ringed Planet is located 0.6 degree south of the fourth-magnitude star Omicron Sagittarii on the night of August 7th/8th. Saturn is currently 18 arc seconds in angular diameter. Its ring system spans 41 arc seconds and is inclined by 25 degrees with respect to the Earth. The waxing gibbous Moon passes three degrees to the west of Saturn on August 11th. Saturn’s peculiar satellite Iapetus passes 1.4 arc minutes north of the planet and shines at eleventh magnitude on the night of August 4th/5th. For additional information on Saturn’s satellites, browse http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/

Uranus lies eleven degrees southeast of the second-magnitude star Hamal (Alpha Arietis) this month. The ice giant is located 2.3 degrees south-southeast of the sixth-magnitude star 19 Arietis. Uranus is stationary in right ascension and begins retrograde (westward) motion on August 12th. The ice giant achieves its highest declination (+13 degrees) since the early 1960s on that date. A waning gibbous Moon passes five degrees south of the planet on August 21st. Visit http://www.bluewaterastronomy.info/resources/Maps/Charts-2019/09uranus_2019_1.pdf and http://www.nakedeyeplanets.com/uranus.htm for finder charts.

Neptune is located in eastern Aquarius. As the month begins, the eighth planet is situated 0.9 degree east-northeast of the fourth-magnitude star Phi Aquarii. By the end of August, Neptune lies just 0.15 degree from that star. A waning gibbous Moon passes four degrees south of Neptune on August 17th. Browse http://www.bluewaterastronomy.info/resources/Maps/Charts-2019/10neptune_2019_1.pdf and http://www.nakedeyeplanets.com/neptune.htm for finder charts.

Finder charts for Uranus and Neptune are also available at https://www.skyandtelescope.com/wp-content/uploads WEB_UrNep19.pdf


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

Comet C/2018W2 (Africano) may shine at eleventh magnitude as it heads southwestward through Camelopardalis during August. It passes just to the north of the fifth-magnitude star SAO 24064 on August 29th. For further information on comets visible this month, browse http://cometchasing.skyhound.com/ and http://www.aerith.net/comet/future-n.html

Asteroid 15 Eunomia (magnitude +8.2) reaches opposition in Aquarius on August 13th, asteroid 16 Psyche (magnitude +9.3) reaches opposition in Capricornus on August 6th, and asteroid 39 Laetitia (magnitude +9.1) reaches opposition in Capricornus on August 16th. A finder chart showing all three asteroids appears on page 48 of the August 2019 issue of Sky & Telescope. For information on asteroid occultations taking place this month, see http://www.asteroidoccultation.com/2018_08_si.htm

A wealth of current information on solar system celestial bodies is posted at http://nineplanets.org/ and http://www.curtrenz.com/astronomy.html

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 charts for the month can be downloaded at http://www.skymaps.com/downloads.html and https://www.telescope.com/content.jsp?pageName=Monthly-Star-Chart

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


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.saguarastro.org/content/db/Bo110BestNGC.pdf respectively.

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/

Author Phil Harrington offers an excellent freeware planetarium program for binocular observers known as TUBA (Touring the Universe through Binoculars Atlas), which also includes information on purchasing binoculars, at http://www.philharrington.net/tuba.htm

Stellarium and Cartes du Ciel are useful freeware planetarium programs that are available at http://stellarium.org/ and https://www.ap-i.net/skychart/en/start


Comet information for: July 31, 2019 11:12 p.m. (New Moon).

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<td>C/2018 W2 (Africano)</td>
<td>Camelopardalis</td>
<td>circumpolar</td>
<td>12:31 p.m.</td>
</tr>
<tr>
<td>29P/Schwassmann-Wachmann</td>
<td>Pices</td>
<td>2:23 a.m.</td>
<td>9:10 a.m.</td>
</tr>
<tr>
<td>C/2018 N2 (ASASSN)</td>
<td>Cetus</td>
<td>4:28 a.m.</td>
<td>10:39 a.m.</td>
</tr>
<tr>
<td>C/2018 R3 (Lemmon)</td>
<td>Camelopardalis</td>
<td>circumpolar</td>
<td>1:36 p.m.</td>
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<tr>
<td>C/2017 M4 (ATLAS)</td>
<td>Lupus</td>
<td>8:47 p.m.</td>
<td>11:26 p.m.</td>
</tr>
<tr>
<td>123P/West-Hartley</td>
<td>Leo</td>
<td>12:56 p.m.</td>
<td>7:47 p.m.</td>
</tr>
<tr>
<td>46P/Wirtanen</td>
<td>Leo</td>
<td>12:22 p.m.</td>
<td>7:31 p.m.</td>
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<tr>
<td>C/2018 L2 (ATLAS)</td>
<td>Andromeda</td>
<td>11:51 p.m.</td>
<td>10:50 a.m.</td>
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### August 1:

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Altitude</th>
<th>Azimuth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum altitude:</td>
<td>01:14</td>
<td>-31.6°</td>
<td>0°</td>
</tr>
<tr>
<td>Astronomical twilight begins:</td>
<td>04:15</td>
<td>-18.0°</td>
<td>45°</td>
</tr>
<tr>
<td>Nautical twilight begins:</td>
<td>04:56</td>
<td>-12.0°</td>
<td>53°</td>
</tr>
<tr>
<td>Civil twilight begins:</td>
<td>05:34</td>
<td>-6.0°</td>
<td>60°</td>
</tr>
<tr>
<td>Sunrise</td>
<td>06:05</td>
<td>-0.8°</td>
<td>65°</td>
</tr>
<tr>
<td>Maximum altitude:</td>
<td>13:13</td>
<td>67.7°</td>
<td>180°</td>
</tr>
<tr>
<td>Sunset</td>
<td>20:22</td>
<td>-6.0°</td>
<td>295°</td>
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<tr>
<td>Civil twilight ends:</td>
<td>20:52</td>
<td>-6.0°</td>
<td>300°</td>
</tr>
<tr>
<td>Nautical twilight ends:</td>
<td>21:29</td>
<td>-12.0°</td>
<td>306°</td>
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<tr>
<td>Astronomical twilight ends:</td>
<td>22:11</td>
<td>-18.0°</td>
<td>314°</td>
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### September 1:

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Altitude</th>
<th>Azimuth</th>
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<tbody>
<tr>
<td>Minimum altitude:</td>
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<td>Astronomical twilight begins:</td>
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<td>-18.0°</td>
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<tr>
<td>Nautical twilight begins:</td>
<td>05:33</td>
<td>-12.0°</td>
<td>68°</td>
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<tr>
<td>Civil twilight begins:</td>
<td>06:06</td>
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<tr>
<td>Sunrise</td>
<td>06:34</td>
<td>-6.0°</td>
<td>78°</td>
</tr>
<tr>
<td>Maximum altitude:</td>
<td>13:07</td>
<td>57.9°</td>
<td>180°</td>
</tr>
<tr>
<td>Sunset</td>
<td>19:39</td>
<td>-6.0°</td>
<td>281°</td>
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<tr>
<td>Civil twilight ends:</td>
<td>20:07</td>
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<td>286°</td>
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<tr>
<td>Nautical twilight ends:</td>
<td>20:40</td>
<td>-12.0°</td>
<td>292°</td>
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<tr>
<td>Astronomical twilight ends:</td>
<td>21:15</td>
<td>-18.0°</td>
<td>298°</td>
</tr>
</tbody>
</table>

For location (40°16’N 76°45’W) Hummelstown, PA, USA:

### August 1:

<table>
<thead>
<tr>
<th>Event</th>
<th>Mercury</th>
<th>Venus</th>
<th>Mars</th>
<th>Jupiter</th>
<th>Saturn</th>
<th>Uranus</th>
<th>Neptune</th>
<th>Pluto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right ascension</td>
<td>7° 39’ 41.3”</td>
<td>8° 32’ 11.0”</td>
<td>9° 28’ 10.9”</td>
<td>16° 52’ 26.7”</td>
<td>19° 6’ 21.7”</td>
<td>2° 16’ 36.1”</td>
<td>23° 17’ 34.6”</td>
<td>19° 31’ 54.7”</td>
</tr>
<tr>
<td>Declination</td>
<td>17° 49’ 57”</td>
<td>19° 51’ 36”</td>
<td>16° 8’ 38”</td>
<td>-22° 5’ 26”</td>
<td>-22° 16’ 36”</td>
<td>13° 8’ 40”</td>
<td>-5° 41’ 47”</td>
<td>-22° 12’ 45”</td>
</tr>
<tr>
<td>Range (AU)</td>
<td>0.708</td>
<td>1.729</td>
<td>2.651</td>
<td>4.627</td>
<td>9.109</td>
<td>19.765</td>
<td>29.141</td>
<td>32.882</td>
</tr>
<tr>
<td>Brightness</td>
<td>15.6°</td>
<td>3.6°</td>
<td>10.4°</td>
<td>125.5°</td>
<td>156.4°</td>
<td>92.6°</td>
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<td>162.3°</td>
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<tr>
<td>Elongation from Sun</td>
<td>-3.8°</td>
<td>1.8°</td>
<td>-2.3°</td>
<td>0.2°</td>
<td>5.8°</td>
<td>7.8°</td>
<td>14.2°</td>
<td>0.1°</td>
</tr>
<tr>
<td>Equatorial Diameter</td>
<td>9.51°</td>
<td>9.65°</td>
<td>3.53°</td>
<td>42.60”</td>
<td>18.24”</td>
<td>3.57”</td>
<td>2.34”</td>
<td>0.10”</td>
</tr>
<tr>
<td>Phase Angle</td>
<td>134.7°</td>
<td>5.1°</td>
<td>6.3°</td>
<td>9.0°</td>
<td>2.3°</td>
<td>2.9°</td>
<td>1.2°</td>
<td>0.5°</td>
</tr>
<tr>
<td>Constellation</td>
<td>Gemini</td>
<td>Cancer</td>
<td>Leo</td>
<td>Ophiuchus</td>
<td>Sagittarius</td>
<td>Aries</td>
<td>Aquarius</td>
<td>Sagittarius</td>
</tr>
<tr>
<td>Meridian transit</td>
<td>12:07</td>
<td>12:59</td>
<td>13:55</td>
<td>21:18</td>
<td>23:31</td>
<td>06:45</td>
<td>03:46</td>
<td>00:01</td>
</tr>
<tr>
<td>Sets</td>
<td>19:09</td>
<td>20:10</td>
<td>20:51</td>
<td>02:01</td>
<td>04:14</td>
<td>13:29</td>
<td>09:26</td>
<td>04:39</td>
</tr>
<tr>
<td>Altitude</td>
<td>65.7°</td>
<td>69.5°</td>
<td>62.0°</td>
<td>-42.2°</td>
<td>-65.8°</td>
<td>7.2°</td>
<td>-37.9°</td>
<td>-68.9°</td>
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<tr>
<td>Azimuth</td>
<td>205.8°</td>
<td>173.9°</td>
<td>145.0°</td>
<td>84.1°</td>
<td>47.8°</td>
<td>281.1°</td>
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<tr>
<td>% illumination</td>
<td>13.7</td>
<td>99.8</td>
<td>98.7</td>
<td>99.4</td>
<td>100</td>
<td>99.9</td>
<td>100</td>
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</tbody>
</table>
September 1:

<table>
<thead>
<tr>
<th></th>
<th>Mercury</th>
<th>Venus</th>
<th>Mars</th>
<th>Jupiter</th>
<th>Saturn</th>
<th>Uranus</th>
<th>Neptune</th>
<th>Pluto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right ascension</td>
<td>10° 37' 23.7&quot;</td>
<td>11° 3' 41.4&quot;</td>
<td>10° 44' 31.9&quot;</td>
<td>16° 54' 45.1&quot;</td>
<td>19° 0' 4.2&quot;</td>
<td>2° 16' 5.2&quot;</td>
<td>23° 14' 47.3&quot;</td>
<td>19° 29' 23.5&quot;</td>
</tr>
<tr>
<td>Declination</td>
<td>10° 35' 29&quot;</td>
<td>7° 33' 16&quot;</td>
<td>9° 9' 0&quot;</td>
<td>-22° 14' 54&quot;</td>
<td>-22° 29' 19&quot;</td>
<td>13° 5' 27&quot;</td>
<td>-6° 0' 15&quot;</td>
<td>-22° 20' 55&quot;</td>
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<tr>
<td>Elongation from Sun</td>
<td>2.7°</td>
<td>5.3°</td>
<td>1.1°</td>
<td>96.0°</td>
<td>124.9°</td>
<td>122.8°</td>
<td>171.7°</td>
<td>131.6°</td>
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<tr>
<td>Constellation</td>
<td>Leo</td>
<td>Leo</td>
<td>Leo</td>
<td>Ophiuchus</td>
<td>Sagittarius</td>
<td>Aries</td>
<td>Aquarius</td>
<td>Sagittarius</td>
</tr>
<tr>
<td>Rises</td>
<td>06:21</td>
<td>07:00</td>
<td>06:37</td>
<td>14:40</td>
<td>16:46</td>
<td>21:54</td>
<td>19:59</td>
<td>17:15</td>
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<tr>
<td>Sets</td>
<td>19:37</td>
<td>19:53</td>
<td>19:40</td>
<td>23:57</td>
<td>02:05</td>
<td>11:27</td>
<td>07:20</td>
<td>02:34</td>
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<tr>
<td>Altitude</td>
<td>-1.4°</td>
<td>1.5°</td>
<td>-1.0°</td>
<td>27.2°</td>
<td>23.2°</td>
<td>-21.5°</td>
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<tr>
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<td>95.7°</td>
<td>148.4°</td>
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<tr>
<td>% illumination</td>
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<td>99.6</td>
<td>100</td>
<td>99.1</td>
<td>99.8</td>
<td>100</td>
<td>100</td>
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</tr>
</tbody>
</table>

The objects listed below are located between 18:00 and 20:00 hours of right ascension.

Sixty binary and multiple stars for August:
5 Aquilae, Struve 2404, 11 Aquilae, Struve 2426, 15 Aquilae, Struve 2449, 23 Aquilae, Struve 2532, Pi Aquilae, 57 Aquilae (Aquila); Beta Cygni (Albireo), 16 Cygni, Delta Cygni, 17 Cygni (Cygnus); 41 & 40 Dracoris, 39 Draconis, Struve 2348, Sigma Draconis, Struve 2573, Epsilon Draconis (Draco); 95 Herculis, 100 Herculis, Struve 2289, Struve 2411 (Hercules); Struve 2349, Struve 2372, Epsilon-1 & Epsilon-2 Lyrae (the Double-Double), Zeta-2 Lyrae, Beta Lyrae, Otto Struve 525, Struve 2470 & Struve 2474 (the Other Double-Double) (Lyra); 67 Ophiuchi, 69 Ophiuchi, 70 Ophiuchi, Struve 2276, 74 Ophiuchi (Ophiuchus); Mu Sagittarii, Eta Sagittarii, 21 Sagittarii, Zeta Sagittarii, H N 119, 52 Sagittarii, 54 Sagittarii (Sagittarius); Struve 2306, Delta Scuti, Struve 2373 (Scutum); Struve 2296, Struve 2303, 59 Serpentis, Theta Serpentis (Serpens Cauda); Struve 2445, Struve 2455, Struve 2457, 4 Vupeculae, Struve 2521, Struve 2523, Struve 2540, Struve 2586, Otto Struve 388, Struve 2599 (Vulpecula)

Notable carbon star for August: V Aquilae

Eighty deep-sky objects for August:
B139, B142, B143, NGC 6709, NGC 6738, NGC 6741, NGC 6751, NGC 6755, NGC 6772, NGC 6778, NGC 6781, NGC 6804, PK64+5.1 (Aquila); NGC 6819, NGC 6826, NGC 6834, (Cygnus); NGC 6643, NGC 6742 (Draco); DoDz 9 (Hercules); M56, M57, NGC 6703, NGC 6791, Ste1 (Lyra); NGC 6572, NGC 6633 (Ophiuchus); H20, M71 (Sagittata); B86, B87, B90, B92, B93, M8, M17, M18, M20, M21, M22, M23, M24, M25, M28, M54, M55, M69, M70, M75, NGC 6520, NGC 6544, NGC 6564, NGC 6553, NGC 6565, NGC 6603, NGC 6618, NGC 6622 (Sagittarius); IC 4703, IC 4756, M16, NGC 6604 (Serpens Cauda); B100, B101, B103, B104, B110, B111, B113, Bas 1, IC 1295, M11, M26, NGC 6649, NGC 6712 (Scutum); Cr 399 (asterism), M27, NGC 6802, NGC 6823, NGC 6834, NGC 6940, St 1 (Vulpecula)

Top ten deep-sky objects for August:
M8, M11, M16, M17, M20, M22, M24, M27, M55, M57

Challenge deep-sky object for August: Abell 53 (Aquila)

Top ten binocular deep-sky objects for August:
Cr 399, IC 4756, M8, M11, M17, M22, M24, M25, M27, NGC 6633 (IC 4756 and NGC 6633 collectively are sometimes called the Binocular Double Cluster)