

**August 2017 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:  
The Robinson Lunar Observatory: <http://www.lunar-occultations.com/rlo/rlondx.htm>.

- 8/1 The astronomical cross-quarter day known as Lammas or Lughnasadh occurs today.
- 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](http://meteorshowersonline.com/showers/alpha_capricornids.html)
- 8/2 Comet 163P/NEAT is at opposition at 3.638 A.U.
- 8/2 The Moon is 9.6° north of the first-magnitude star Antares (Alpha Scorpii) at 5:00 a.m.
- 8/2 Venus is 2.4° south of the bright open cluster M35 in Gemini at 11:00 a.m.
- 8/2 Mercury is at aphelion (0.4667 astronomical units from the Sun) at 12:00 p.m.
- 8/2 The Moon is at apogee, subtending 29' 30'' from a distance of 405,024 kilometers (251,671 miles), at 1:55 p.m.
- 8/3 Saturn is 3.4° south of the Moon at 4:00 a.m.
- 8/3 Uranus is stationary in right ascension at 6:00 a.m.
- 8/4 Comet 2P/Encke is at opposition at 1.288 A.U.
- 8/5 Comet 116P/Wild is at closest approach to Earth at 2.866 A.U.
- 8/5 Niels Abel's 215th birthday (1802).
- 8/5 Venus is at its greatest declination north in 2017 (22.0°) at 4:00 p.m.
- 8/6 Sylvain Arend's 115th birthday (1902).
- 8/6 Johann Bernoulli's 350th birthday (1667).
- 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](http://meteorshowersonline.com/showers/iota_aquarids.html)
- 8/7 Comet 236P/LINEAR is at opposition at 1.118 A.U.
- 8/7 Full Moon (known as the Fruit, Grain, Green Corn, or Sturgeon Moon) occurs at 2:11 p.m.
- 8/7 A partial lunar eclipse that is visible from Australia, Antarctica, Asia, Africa, the Middle East, Europe, and extreme eastern South America, begins at 1:22 p.m.
- 8/8 The Moon is at descending node (longitude 324.2°) at 6:56 a.m.
- 8/8 Upsilon Pegasids meteor shower (minor activity) peaks 8/9. Duration is from 7/25 to 8/19. Observing and history: [http://meteorshowersonline.com/showers/upsilon\\_pegasids.html](http://meteorshowersonline.com/showers/upsilon_pegasids.html)
- 8/9 Neptune is 0.82° north-northwest of the Moon, with an occultation occurring in far western Australia, the Kerguelen Islands, and most of Antarctica, at 7:00 p.m.
- 8/10 The Sun enters the constellation of Leo (longitude 138.16° on the ecliptic) at 15:00
- 8/11 Comet 29P/Schwassmann-Wachmann is at opposition at 4.813 A.U.
- 8/11 Stargazing Lecture: The Origin of the Universe and the Arrow of Time is being held in Pasadena, California.
- 8/11 Mt. Carleton Star Party being held through the 13th at Mount Carleton Provincial Park, Canada
- 8/11 August Eridanids meteor shower (minor activity) peaks 11/12. Duration is from the 2nd to 27th. Observing and history: [http://meteorshowersonline.com/showers/august\\_eridanids.html](http://meteorshowersonline.com/showers/august_eridanids.html)
- 8/12 Comet 29P/Schwassmann-Wachmann is at closest approach to Earth at 4.813 A.U.
- 8/12 Summer on the Hudson: SunGaze being held in Manhattan, New York.
- 8/12 Mercury stationary in right ascension at 2:00 a.m.

8/12 The peak of the Perseid meteor shower () occurs at 3:00 p.m.

8/12 Perseids meteor shower (major activity - a zenithal hourly rate of 150 or more per hour) peaks at 8:12 p.m. Duration is from 7/23 to 8/22. Observing and history: <http://meteorshowersonline.com/perseids.html>

8/13 Comet 214P/LINEAR is at opposition at 3.401 A.U.

8/13 Heinrich d'Arrest's 195th birthday (1822).

8/13 Uranus is 4.2° north-northwest of the Moon at 4:00 a.m.

8/13 Alpha Ursa Majorids meteor shower (minor activity) peaks 13/14. 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)

8/13 Northern Delta Aquarids meteor shower (moderate activity) peaks 13/14. 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)

8/14 Last Quarter Moon occurs at 9:15 p.m.

8/15 Comet 116P/Wild is at opposition at 2.882 A.U.

8/15 Louis de Broglie's 125th birthday (1892).

8/15 The Moon is 9.3° north-northwest of the bright open cluster M45 (the Pleiades or Subaru) at 11:00 a.m.

8/15 The Curtiss Cross, an X-shaped clair-obscur illumination effect located between the craters Parry and Gambart, is predicted to occur at 6:36 p.m.

8/16 Comet 77P/Longmore is at opposition at 2.601 A.U.

8/16 The Moon is 0.39° north-northwest of the first-magnitude star Aldebaran (Alpha Tauri), with an occultation occurring in western Asia, the Middle East, Europe, northernmost Africa, the Caribbean, and the northern tip of South America at 3:00 a.m.

8/16 The Moon is 0.11° east of asteroid (8) Flora at 4:00 p.m.

8/16 The middle of eclipse season, i.e., the Sun is at the same longitude as Moon's ascending node (144.2°), occurs at 5:00 p.m.

8/17 Comet 69P/Taylor is at opposition at 3.139 A.U.

8/17 140th Anniversary (1877) of Asaph Hall's discovery of Mars' moon Phobos.

8/17 The Moon is 5.1° south of M35 at 4:00 p.m.

8/18 Comet 164P/Christensen is at closest approach to Earth at 2.026 A.U.

8/18 The Moon is at perigee, subtending nearly 32' 38" from a distance of 366,123 kilometers (227,497 miles), at 9:18 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 Venus is 2.2° north of the Moon at 12:00 a.m.

8/19 The Moon is 9.4° south of the first magnitude star Pollux (Beta Geminorum) at 4:00 a.m.

8/20 40th Anniversary (1977) of Voyager 2 launch.

8/20 The Moon is 2.8° south of the bright open cluster M44 (the Beehive Cluster or Praesepe) at 3:00 a.m.

8/20 Venus is 7.2° south of Pollux at 7:00 p.m.

8/21 Total solar eclipse visible from the United States.

8/21 Comet C/2015 VL62 is at closest approach to Earth at 1.742 A.U.

8/21 Comet C/2015 VL62 is at opposition at 1.742 A.U.

8/21 The Moon is at the ascending node (longitude 144.2°) at 6:34 a.m.

8/21 New Moon (lunation 1158) occurs at 2:30 p.m.

8/22 The Moon is 5.9° ecliptic plane (-7.0°) at 3:00 p.m.

8/23 Comet 49P/Arend-Rigaux is at opposition at 2.273 A.U.

8/23 Comet 247P/LINEAR is at opposition at 3.161 A.U.

8/24 Comet 252P/LINEAR is at opposition at 3.308 A.U.

8/24 Comet P/2016 A7 (PANSTARRS) is at opposition at 3.550 A.U.

8/25 Saturn is stationary in right ascension at 9:00 a.m.

8/25 Jupiter is 3.3° south-southwest of the Moon at 11:00 a.m.

8/25 The Moon is 6.6° south-southwest of the first-magnitude star Spica (Alpha Virginis) at 5:00 p.m.

- 8/25 Northern Iota Aquarids meteor shower (moderate activity) peaks 25/26. Duration is from 8/11 to 9/10. Observing and history:  
[http://meteorshowersonline.com/showers/iota\\_aquarids.html](http://meteorshowersonline.com/showers/iota_aquarids.html)
- 8/25 Gamma Leonids meteor shower (daylight activity) peaks on 25/26. Duration is from the 14th until September 12. Observing and history:  
[http://meteorshowersonline.com/showers/gamma\\_leonids.html](http://meteorshowersonline.com/showers/gamma_leonids.html)
- 8/27 Comet C/2016 P4 (PANSTARRS) is at closest approach to Earth at 5.316 A.U.
- 8/27 Summer on the Hudson: SunGaze being held in Manhattan, New York.
- 8/27 55th Anniversary (1962) of Mariner 2 Launch.
- 8/28 Comet C/2015 VL62 is at perihelion at 2.720 A.U.
- 8/28 Astro Hack Week 2017 being held through Sept. 1 in Seattle, Washington.
- 8/29 Comet 236P/LINEAR is at closest approach to Earth at 1.074 A.U.
- 8/29 First Quarter Moon occurs at 8:13;
- 8/29 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 occur at 4:39 a.m.
- 8/29 Mercury is stationary in right ascension at 9:00 p.m.
- 8/30 Asteroid 87 Sylvia (2 Moons) is at closest approach to Earth at 2.176 A.U.
- 8/30 Venus at ascending node through the ecliptic plane at 7:00 a.m.
- 8/30 The Moon is at apogee, subtending 29' 34" from a distance of 404,306 kilometers (251,226 miles), at 7:25 a.m.
- 8/30 Saturn is 3.5° south of the Moon at 11:00 a.m.
- 8/30 Mars is at its greatest latitude north of the ecliptic plane (1.8°) at 3:00 p.m.
- 8/31 Edouard Stephan's 180th birthday (1837).
- 8/31 James Ferguson's 220th birthday (1797).

John Flamsteed and Maria Mitchell were born this month. The gibbous phase of Mars was first observed by Francesco Fontana on August 24, 1738. William Herschel discovered Enceladus on August 28, 1789. Asaph Hall discovered Deimos on August 11, 1877 and Phobos on August 17, 1877.

A waning gibbous Moon will compromise the peak of the Perseid meteor shower on August 12th. Comet 109P/Swift-Tuttle is the source of Perseid meteors. For more on this year's Perseids, see pages 51 of the August 2017 issue of *Sky & Telescope* or click on <http://www.timeanddate.com/astronomy/meteor-shower/perseid.html> and <http://earthsky.org/astronomy-essentials/everything-you-need-to-know-perseid-meteor-shower>

The Moon is 8.6 days old, is illuminated 63.2%, subtends 29.9 arc minutes, and is located in Libra on August 1st at 0:00 UT. The Moon is at its greatest northern declination on August 18th (+19.3 degrees) and its greatest southern declination on August 5th (-19.4 degrees). Longitudinal libration is at a maximum of +5.7 degrees on August 24th and a minimum of -5.3 degrees on August 11th. Latitudinal libration is at a maximum of +6.8 degrees on August 15th and a minimum of -6.8 degrees on August 1st and August 28th. The Moon is at apogee on August 2nd and August 30th and at perigee on August 18th. New Moon (i.e., the dark of the Moon) occurs on August 21st. A partial lunar eclipse that is visible from Australia, Asia, Africa, Europe and other parts of the world occurs on August 7th. Greatest eclipse occurs at 18:20 UT. The Moon occults Neptune on August 9th and Aldebaran on August 16th from certain parts of the world. 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. Times and dates for the lunar 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 10th. A total solar eclipse takes place on August 21st, the first one visible from the contiguous United States in over 38 years. The path of totality runs from the Pacific Ocean to the Atlantic Ocean, crossing the United States from Oregon to South Carolina. Maximum totality is 2 minutes and 40.3 seconds in length and occurs in Illinois at 18:21 UT (2:21 p.m. EDT). Greatest eclipse, the point

when the axis of the lunar shadow passes closest to the center of the Earth, occurs in Kentucky at 18:25 UT (2:25 p.m. EDT). For additional information on the eclipse, browse <https://eclipse2017.nasa.gov/eclipse-who-what-where-when-and-how>, <http://www.astronomy.com/great-american-eclipse-2017>, and <http://www.skyandtelescope.com/total-solar-eclipse-august-2017/> or see pages 48-51 of the August 2017 issue of *Sky & Telescope* and pages 20-43 of the August 2017 issue of *Astronomy*.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on August 1: Mercury (magnitude +0.4, 8.0", 44% illuminated, 0.85 a.u., Leo), Venus (magnitude -4.0, 14.5", 74% illuminated, 1.15 a.u., Gemini), Mars (magnitude +1.7, 3.5", 100% illuminated, 2.66 a.u., Cancer), Jupiter (magnitude -1.9, 34.3", 99% illuminated, 5.75 a.u., Virgo), Saturn (magnitude +0.3, 17.8", 100% illuminated, 9.34 a.u., Ophiuchus), Uranus (magnitude +5.8, 3.6", 100% illuminated, 19.47 a.u. on August 16th, Pisces), Neptune (magnitude +7.8, 2.4", 100% illuminated, 28.99 a.u. on August 16th, Aquarius), and Pluto (magnitude +14.2, 0.1", 100% illuminated, 32.56 a.u. on August 16th, Sagittarius).

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

Mercury is at aphelion on August 2nd, is at its greatest heliocentric latitude south on August 22nd, and is in inferior conjunction on August 26th. The speediest planet is just six degrees in altitude 30 minutes after sunset on August 1st and is only three degrees above the horizon on August 8th.

Venus lies about 20 degrees above the eastern horizon one hour before sunrise. A thin crescent Moon passes just to the north of the brightest planet on the morning of August 19th. Venus crosses into Cancer on August 25th. By the end of August, the eastward motion of the planet carries Venus to just one degree from M44 (the Beehive Cluster).

Mars is lost in the glare of the Sun this month.

Jupiter sets around 11:00 p.m. local daylight time. It drops in brightness from magnitude -1.9 to -1.7 and from 34.3 to 32.2 arc seconds in apparent size during August. The Moon passes 3.3 degrees north-northeast of Jupiter on August 25th.

As twilight ends, the Ringed Planet lies approximately 30 degrees above the southern horizon. Saturn is 17.4 arc seconds in diameter at its equator and 16.1 arc seconds at its poles on August 15th. Its ring system spans 40 arc seconds and is inclined nearly 27 degrees with respect to the Earth on that date. Saturn is stationary in right ascension and resumes direct (eastward) motion on August 25th. The Moon passes just to the north of Saturn on August 3rd and August 30th. Eighth-magnitude Titan, Saturn's largest satellite, is north of the planet on August 10th and August 26th and south of it on August 2nd and August 18th. On the night of August 13th/14th, Enceladus reaches greatest eastern elongation and Mimas reaches greatest western elongation. Tethys lies to the west of Saturn and Dione, Rhea, and Titan to the east. The peculiar satellite Iapetus lies two arc minutes north of Saturn and shines at eleventh magnitude on that night. For additional information on Saturn's satellites, browse <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/>

Uranus is situated one degree north of the fourth-magnitude star Omicron Piscium for the entire month. The ice giant rises in the late evening. Uranus is stationary in right ascension and begins retrograde (westward) motion on August 3rd. Browse <http://bluewaterastronomy.info/resources/uranus-finder-chart-2017.png> for a finder chart.

The eighth planet transits at approximately 3:00 a.m. local daylight time as August begins. Neptune is located two degrees east of the fourth-magnitude star Lambda Aquarii on the first day

of August. By the end of the month, Neptune's westward motion carries it to 1.3 degrees east of that star. A finder chart is posted at <http://bluewaterastronomy.info/resources/neptune-finder-chart-2017.png>

Additional online finder charts for Uranus and Neptune can be found at <http://www.nakedeyeplanets.com/uranus.htm> and <http://www.nakedeyeplanets.com/neptune.htm> and also at [http://wwwcdn.skyandtelescope.com/wp-content/uploads/WEB\\_Uranus\\_Neptune17.pdf](http://wwwcdn.skyandtelescope.com/wp-content/uploads/WEB_Uranus_Neptune17.pdf)

This month Pluto is located near the Teaspoon asterism in Sagittarius. The dwarf planet is highest in altitude in the late evening. Articles on locating and observing Pluto are available on pages 48 and 49 of the July issue of *Sky & Telescope* and pages 64 and 65 of the July issue of *Astronomy*. See page 243 of the RASC *Observer's Handbook 2017* for a paper finder chart. A basic finder chart is posted online at <http://www.bluewaterastronomy.info/resources/Pluto-finder-2017.png> and a more detailed one at [http://wwwcdn.skyandtelescope.com/wp-content/uploads/Pluto\\_2017.pdf](http://wwwcdn.skyandtelescope.com/wp-content/uploads/Pluto_2017.pdf)

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

Comet C/2015 ER61 (PanSTARRS) may shine at ninth-magnitude as it travels eastward through Taurus this month, passing less than one degree south of M45 (the Pleiades) from August 14th through August 21st. Ninth-magnitude Comet C/2015 V2 (Johnson) glides southward from Centaurus into Lupus. Comet 71P/Clark heads through southern Scorpius. The tenth-magnitude comet passes less than one degree from the second-magnitude star Shaula (Lambda Scorpii) and the seventh-magnitude globular cluster NGC 6441 during the final two weeks of the month. For further information on comets visible this month, browse <http://cometchasing.skyhound.com/> and <http://www.aerith.net/comet/future-n.html>

Asteroid 89 Julia passes northwestward through Pegasus during August. It reaches magnitude +9.0 near the end of the month. It lies just to the southwest of the fifth-magnitude stars 55, 57, 58, and 59 Pegasi on the nights of August 15th and August 16th. For information on asteroid occultations taking place this month, see [http://www.asteroidoccultation.com/2016\\_08\\_si.htm](http://www.asteroidoccultation.com/2016_08_si.htm)

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

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

Comet information for: August 21, 2017 (New Moon).

|   | Constellation | Rises       | Transits   | Sets       |
|---|---------------|-------------|------------|------------|
| C/2015 V2 (Johnson)                         | Hydra         | 2:59 p.m.   | 7:22 p.m.  | 11:45 p.m. |
| C/2015 ER61 (PanSTARRS)                     | Taurus        | 11:26 p.m.  | 6:55 a.m.  | 2:25 p.m.  |
| 71P/Clark                                   | Scorpius      | 5:33 p.m.   | 8:44 p.m.  | 12:05 a.m. |
| 65P/Gunn                                    | Scorpius      | 2:32 p.m.   | 7:05 p.m.  | 11:38 p.m. |
| C/2015 O1 (PannSTARRS)                      | Serpens Caput | 11:30 a.m.  | 6:58 p.m.  | 2:28 a.m.  |
| C/2015 VL (Lemmon-Yeung-PannSTARRS) Pegasus | Pegasus       | 6:17 p.m.   | 12:34 a.m. | 6:49 a.m.  |
| 29P/Schwassmann-Wachman 1                   | Aquarius      | 7:13 p.m.   | 12:28 a.m. | 5:43 a.m.  |
| 217P/(LINEAR)                               | Orion         | 2:17 a.m.   | 8:57 a.m.  | 3:38 p.m.  |
| 213P/Van Ness                               | Sagittarius   | 7:31 p.m.   | 11:41 p.m. | 3:47 a.m.  |
| C/2016 R2 (PannSTARRS)                      | Orion         | 2:35 a.m.   | 8:25 a.m.  | 2:14 p.m.  |
| C/2016 N4 (MASTER)                          | Cassiopeia    | Circumpolar | 3:07 a.m.  |            |
| C/2017 O1 (ASSASSN)                         | Taurus        | 12:24 a.m.  | 6:32 a.m.  | 12:40 p.m. |

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

August 1:

|                     | Mercury   | Venus   | Mars   | Jupiter  | Saturn  | Uranus   | Neptune  | Pluto   |
|---------------------|---|---|--|--|---|--|--|---|
| Right ascension     | 10 <sup>h</sup> 29 <sup>m</sup> 50.6 <sup>s</sup> | 6 <sup>h</sup> 4 <sup>m</sup> 13.6 <sup>s</sup> | 8 <sup>h</sup> 41 <sup>m</sup> 13.4 <sup>s</sup> | 13 <sup>h</sup> 3 <sup>m</sup> 56.4 <sup>s</sup> | 17 <sup>h</sup> 22 <sup>m</sup> 50.1 <sup>s</sup> | 1 <sup>h</sup> 45 <sup>m</sup> 56.1 <sup>s</sup> | 23 <sup>h</sup> 0 <sup>m</sup> 33.4 <sup>s</sup> | 19 <sup>h</sup> 14 <sup>m</sup> 47.1 <sup>s</sup> |
| Declination         | 7° 32' 28"  | 21° 53' 34"                                     | 19° 26' 51"                                      | -5° 31' 35"                                      | -21° 54' 33"                                      | 10° 18' 59"                                      | -7° 21' 0"                                       | -21° 35' 29"                                      |
| Range (AU)          | 0.835   | 1.152   | 2.658  | 5.757  | 9.353   | 19.699   | 29.102   | 32.435  |
| Elongation from Sun | 27.0°   | 38.4°   | 2.1°   | 67.5°  | 132.0°  | 101.1°   | 145.9°   | 158.0°  |
| Brightness          | 0.6   | -3.9  | 1.7  | -1.7   | 0.3   | 5.8  | 7.8  | 14.2  |
| Equatorial Diameter | 8.06"   | 14.49"  | 3.52"  | 34.24"   | 17.77"  | 3.58"  | 2.35"  | 0.10"   |
| Phase Angle         | 98.5°   | 60.5°   | 1.3°   | 9.9°   | 4.3°  | 2.9°   | 1.1°   | 0.7°  |
| Constellation       | Leo   | Gemini  | Cancer   | Virgo  | Ophiuchus   | Pisces   | Aquarius   | Sagittarius                                       |
| Meridian transit    | 14:55   | 10:29   | 13:06  | 17:28  | 21:46   | 06:12  | 03:27  | 23:38   |
| Rises               | 08:29   | 03:09   | 05:57  | 11:48  | 17:07   | 23:34  | 21:49  | 18:57   |
| Sets                | 21:20   | 17:49   | 20:15  | 23:09  | 02:30   | 12:46  | 09:01  | 04:23   |
| Altitude            | 41.7°   | 61.0°   | 66.5°  | 5.2°   | -53.9°  | 5.8°   | -36.4°   | -69.9°  |
| Azimuth             | 121.6°  | 238.6°  | 148.6°   | 101.7°   | 70.7°   | 278.6°   | 294.6°   | 24.6°   |
| % illumination      | 43.4  | 74.4  | 100  | 99.3   | 99.9  | 99.9   | 100  | 100   |

September 1:

|                     | Mercury  | Venus  | Mars   | Jupiter   | Saturn   | Uranus   | Neptune   | Pluto   |
|---------------------|--|--|--|---|--|--|---|---|
| Right ascension     | 10 <sup>h</sup> 1 <sup>m</sup> 29.2 <sup>s</sup> | 8 <sup>h</sup> 39 <sup>m</sup> 13.5 <sup>s</sup> | 9 <sup>h</sup> 59 <sup>m</sup> 42.9 <sup>s</sup> | 13 <sup>h</sup> 22 <sup>m</sup> 29.1 <sup>s</sup> | 17 <sup>h</sup> 21 <sup>m</sup> 3.9 <sup>s</sup> | 1 <sup>h</sup> 44 <sup>m</sup> 38.8 <sup>s</sup> | 22 <sup>h</sup> 57 <sup>m</sup> 39.9 <sup>s</sup> | 19 <sup>h</sup> 12 <sup>m</sup> 26.2 <sup>s</sup> |
| Declination         | 9° 5' 50"  | 18° 31' 51"                                      | 13° 29' 47"                                      | -7° 30' 4"  | -21° 58' 36"                                     | 10° 11' 2"                                       | -7° 39' 33"                                       | -21° 43' 4"                                       |
| Range (AU)          | 0.684  | 1.347  | 2.634  | 6.144   | 9.805  | 19.238   | 28.940  | 32.771  |
| Elongation from Sun | 10.2°  | 31.7°  | 11.8°  | 42.8°   | 101.9°   | 131.1°   | 176.2°  | 127.7°  |
| Brightness          | 2.9  | -3.8   | 1.8  | -1.6  | 0.4  | 5.7  | 7.8   | 14.2  |
| Equatorial Diameter | 9.84"  | 12.39"   | 3.55"  | 32.09"  | 16.95"   | 3.66"  | 2.36"   | 0.10"   |
| Phase Angle         | 150.0°   | 47.4°  | 7.1°   | 7.2°  | 5.6°   | 2.2°   | 0.1°  | 1.4°  |
| Constellation       | Leo  | Cancer   | Leo  | Virgo   | Ophiuchus  | Pisces   | Aquarius  | Sagittarius                                       |
| Meridian transit    | 12:24  | 11:03  | 12:23  | 15:45   | 19:43  | 04:09  | 01:22   | 21:34   |
| Rises               | 05:55  | 03:56  | 05:36  | 10:11   | 15:04  | 21:31  | 19:46   | 16:53   |
| Sets                | 18:55  | 18:09  | 19:09  | 21:19   | 00:26  | 10:43  | 06:55   | 02:18   |
| Altitude            | 38.3°  | 58.8°  | 41.7°  | -10.0°  | -62.9°   | 16.0°  | -27.2°  | -71.1°  |
| Azimuth             | 113.9°   | 126.6°   | 110.2°   | 91.4°   | 54.5°  | 269.9°   | 283.8°  | 347.6°  |
| % illumination      | 6.0  | 83.8   | 99.6   | 99.6  | 99.8   | 100  | 100   | 100   |

For location (40°16'N 76°45'W) Hummelstown, PA, USA:  
 August 1:

| Event                         | Time  | Altitude | Azimuth |
|-------------------------------|-------|----------|---------|
| Minimum altitude:             | 01:14 | -31.8°   | 0°      |
| Astronomical twilight begins: | 04:16 | -18.0°   | 46°     |
| Nautical twilight begins:     | 04:57 | -12.0°   | 54°     |
| Civil twilight begins:        | 05:35 | -6.0°    | 60°     |
| Sunrise:                      | 06:05 | -0.8°    | 65°     |
| Maximum altitude:             | 13:13 | 67.6°    | 180°    |
| Sunset:                       | 20:21 | -0.8°    | 294°    |
| Civil twilight ends:          | 20:51 | -6.0°    | 299°    |
| Nautical twilight ends:       | 21:29 | -12.0°   | 306°    |
| Astronomical twilight ends:   | 22:10 | -18.0°   | 314°    |

September 1:

| Event                         | Time  | Altitude | Azimuth |
|-------------------------------|-------|----------|---------|
| Minimum altitude:             | 01:07 | -41.5°   | 360°    |
| Astronomical twilight begins: | 04:59 | -18.0°   | 62°     |
| Nautical twilight begins:     | 05:34 | -12.0°   | 68°     |
| Civil twilight begins:        | 06:07 | -6.0°    | 74°     |
| Sunrise:                      | 06:35 | -0.8°    | 79°     |
| Maximum altitude:             | 13:07 | 57.8°    | 180°    |
| Sunset:                       | 19:38 | -0.8°    | 281°    |
| Civil twilight ends:          | 20:06 | -6.0°    | 286°    |
| Nautical twilight ends:       | 20:39 | -12.0°   | 291°    |
| Astronomical twilight ends:   | 21:14 | -18.0°   | 298°    |

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 Draconis, 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, Stel (Lyra); NGC 6572, NGC 6633 (Ophiuchus); H20, M71 (Sagitta); 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 6546, NGC 6553, NGC 6565, NGC 6603, NGC 6818, NGC 6822 (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 4765, M8, M11, M17, M22, M24, M25, M27, NGC 6633 (IC 4756 and NGC 6633 collectively are sometimes called the Binocular Double Cluster)