

Astrophotography

By Russell Kille

2020 Calendar

Member of the Toledo Astronomical Association

www.toledoastronomy.org

The Genesis Home Observatory

www.rkille.com

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OTA: Celestron 14" Edge HD SCT with .7x reducer

Focal Length: 2737mm





Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 1980 seconds

Crab Nebula (M1)
Apparent Magnitude: 8.4
Aprox. Distance: 6,500 light-years
Constellation: Taurus
Diameter: 11 light-years

The Crab Nebula is a supernova remnant likely corresponding to a bright supernova recorded by Chinese astronomers in 1054, the nebula was observed later by English astronomer John Bevis in 1731. The nebula was the first astronomical object identified with a historical supernova explosion.

January 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			New Year's Day 1 1801 - Italian Catholic priest Giuseppe Piazzi discovers the asteroid Ceres	 2 Jupiter's moon Elara is discovered in 1905 by Charles Perrine at Lick Observatory	3 1986 - Voyager 2 team discovers Uranus' moons Juliet & Portia	4 Quadrantids meteors peak 120 zhr from EH Asteroid 2003
5 Earth at Perihelion (closest to the sun)	6 1987 - Univ. of CA announces proto galaxy 3C 326 at 1 billion, trillion miles from Earth	7 1610 - Jupiter's moons Ganymede & Callisto discovered by Galileo	8 1610 - Galileo finds two more moons, Io & Europa around Jupiter	9 1986 - Voyager 2 team Synnott and Stephens discover Uranus' moon Cressida	 10 TAA Holiday Party at Frank's house. RSVP required	11 1787 - Uranus's moons Titania & Oberon are discovered by William Herschel
12 Quadrantids End	13 1986 - Uranus' moons Desdemona, Rosalind & Belina discovered on Voyager 2 images	14 2005 - European Space Agency's Huygens probe is first to land on Saturn's moon Titan	15 1948 - US discusses developing a program for Earth orbiting satellites	16 1903 - German Max Wolf discovers 500 th asteroid designated as 500 Selinur	 17 1889 - British dwarf star astronomer Sir Ralph Fowler is born	18 1971 - US astronomer Amy Barger, studier of quasars & black hole activities in galaxies is born
19 2006 - New Horizons probe launched for Pluto. It arrives 14 years later in 2015	Martin L. King Jr. Day 20 1986 - Voyager 2 team discovers Uranus' moons Cordelia & Ophelia	21 1979 - Neptune's Great dark spot imaged by Voyager 2. Was about the size of the earth	22 1975 - LANDSTAT 2 satellite launched to get global seasonal data	23 2003 - Last communication with Voyager 1	 24 1986 - Voyager 2 has closest approach to Uranus	Chinese New Year 25 2004 - Opportunity Rover lands on Mars 3 weeks after Spirit Rover
26 Hi'iaka moon of dwarf planet Haumea is discovered in 2005 at Keck Observatory	27 1908 - Jupiter's moon Pasiphae discovered by P.J. Melotte	28 Alpha Centaurids begin	29 1613 - Galileo logs an unknown object now known as Neptune	30 1961 - President Kennedy announces satellite program	31 1958 - Explorer 1 is first US satellite prototype suggested by James Van Allen	



OTA: Celestron 11" SCT with Hyperstar f/2

Focal Length: 560mm





Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 650 seconds

Orion Nebula (M42)
Apparent Magnitude: 4.0
Aprox. Distance: 1,344 light-years
Constellation: Orion
Diameter: 24 light-years

The Orion Nebula is visible to the naked eye in the night sky and is the closest region of massive star formation to Earth. The nebula has revealed much about the process of how stars and planetary systems are formed from collapsing clouds of gas and dust.

February 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						 1 1991- Galileo probe flies 894 miles above Europa's surface
Groundhog Day 2 Super Bowl Sunday	3 1966 – Soviet Luna 9 soft-lands on Moon and transmits photographic data	4 1906 – Armature astronomer Clyde Tombaugh discovers Pluto	5 1974 – Mariner 10 first to image Venus from 3,584 miles above the surface	6 1927 - US physicist and designer of space habitats is born.	7 TAA Monthly Meeting 7:30PM at Univ. of Toledo McMaster Hall 4009	8 Alpha Centaurids meteors peak 6zhr unknown source
 9 Astronomer Vettius Valens, Writer of the oldest celestial manual, born 120 BC	10 Mercury at greatest E. Elongation (PM)	11 ISS Lunar Transit within 100km of Toledo, OH	12 1947 – A meteorite fall leaves about 70 tons of pieces and material in Siberia	13 1990 – Voyage 1 craft images solar system outside of solar system	14 Valentine's Day 1898 – Swiss astronomer Fritz Zwicky who theorized dark matter was born	 15 2013 – A super bolide meteor creates sonic boom and shock wave in Chelyabinsk, Russia
16 1781 – French Astronomer Pierre Mechain discovers Owl Nebula - M97	17 Presidents' Day Winter Star Party begins Feb 17-23	18 Mars – Moon Occultation	19 1771 – Elliptical galaxy M49 discovered by Charles Messier	20 1773 - First Antarctic aurora recorded by Captain Cook on his ship 'Resolution'	21 Alpha Centaurids End	22 Kuiper Belt object Quaoar has moon Weywot discovered in 2007 by Michael Brown
 23 1583 - Jean Morin, the chief opponent of Galileo is born	24 1969 – Mariner 6 probe is launched for Mars to study surface and atmosphere	25 1961 – Meteorite falls in Djermaia, Chad, Africa. Weight was 7.7 kilos	26 Ash Wednesday 1616 - Galileo is banned by Catholic Church for heliocentric theory	27 1919 – First public program of composer Gustav Holst's "The Planets"	28 2007 – New Horizons got a gravity assist from Jupiter	29 1582 – The leap year is invented to keep Earth's orbit aligned with Gregorian calendar



OTA: Celestron 11" SCT with Hyperstar f/2

Focal Length: 560mm





Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 371 seconds

Triangulum Galaxy (M33)
Apparent Magnitude: 5.7
Aprox. Distance: 3 million light-years
Diameter: 60,000 light-years
Aprox. # of stars: 40 billion

The Triangulum is spiral galaxy and the third-largest member of the Local Group of galaxies making it the smallest of the spiral galaxies, behind the Milky Way and the Andromeda Galaxy. It is one of the most distant permanent objects that can be viewed with the naked eye. It also has an H-II nucleus.

March 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 1980 – Saturn's moon Helene discovered by Pierre Laques and Jean Lecacheux	 2 1972 – Pioneer 10 send back images of Jupiter	3 1978 – Pioneer 4 passes within 37,300 miles of Moon	4 1923 - Amateur astronomer Sir Patrick Moore is born	5 1999 – Voyager 1 photo shows new moon of Jupiter – called Thebe	6 TAA Monthly Meeting 7:30PM at Univ. of Toledo McMaster Hall 4009	7 1837 – Amateur astronomer, doctor and astrophotographer is born
Daylight Savings Time Begins 8 1804 – American telescope maker Alvan Clark born	 Super Full 9 1564 – David Fabricius born. Discover of Mira - first periodic variable star	10 2006 – Mars Reconnaissance orbiter inserted into Mars orbit	11 1811 – Co-discovery of Neptune, Urbain LeVerrier is born	12 1835 – Canadian astronomer Simon Newcomb born	13 1781 – William Herschel discovers Uranus	14 1879 – Albert Einstein born
15 1781 – Pierre Mechain discovers M9 galaxy in Ophiuchus	 16 2012 – Palo Fagotti discovers supernova SN2012aw in Leo's M95 galaxy	St. Patrick's Day 17 1899 - Saturn's moon Phoebe discovered by William Pickering	18 2011 – NASA's spacecraft New Horizon's flies by Uranus in 2011	Spring Equinox 19 721B.C. – First lunar eclipse recorded in Babylon	20 2015 – Solar eclipse, equinox and superior moon all occur on the same day	21 TAA Messier Marathon Pioneer Boy Scout Camp
22 1394 – Ulugh Beg from Persia makes Sextant to use in observatory	23 Mercury at greatest W. Elongation (AM)	 24 Venus greatest E. Elongation (PM)	25 1655- Dutch astronomer Christian Huygens discovers Saturn's moon Titan	26 1910 - French Astronomer Auguste Charlois, discoverer of 99 asteroids dies	27 1781 – Pierre Mechain discovers M101, the Pinwheel galaxy	28 1802 – German astronomer Wilhem Olbers discovers asteroid 2 Pallas
29 1807 - Wilhem Olbers discovers asteroid 4 Vesta	30 1654 – Danish island of Funen has a stony meteorite fall	31 1966 – Luna 10, first craft in lunar orbit, launched by Soviets				



OTA: Celestron 14" Edge HD SCT with .7x reducer

Focal Length: 2737mm






Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 510 seconds

Dumbbell Nebula (M27)
Apparent Magnitude: 7.5
Aprox. Distance: 1,360 light-years
Constellation: Vulpecula
Diameter: 2.88 light-years

This nebula is the 2nd largest known planetary nebula. It consists of very rarified gas that has been ejected from the hot central star now burning as a white dwarf star now in its last stage of life which will continue heating the gas for billions of years, until it depletes its energy supply and becomes a black dwarf. The gas is expanding at a rate of 17 miles per second.

April 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			 1 1960 – TIROS-I is first successful weather satellite put in space	2 1854 – Louis Fizeau & Lion Foucault photograph sun for the first time	3 TAA Monthly Meeting 7:30PM at Univ. of Toledo McMaster Hall 4009	4 1842 – Hermann Vogel, discoverer of spectroscopic binaries is born
Palm Sunday 5 1799 - First recorded meteorite fall in North America – Baton Rouge, LA	6 648 BC - Archilochus total solar eclipse was saros series 38 in Greece	 Super Full 7 2001- Mars Odyssey launched	8 1980 - Saturn's moon Telesto discovered by Smith, Reitsema, Larson & Fountain	9 1936 - Palomar's 200 inch mirror blank arrives in Pasadena, CA for grinding	10 937AD - Halley's Comet closest approach to Earth, 0.0342 AU	11 1986- Halley's Comet makes another close approach to Earth
Easter 12 1851 - British sunspot and solar magnetic cycle astronomer Edward Maunder is born	13 2007 - S. Sheppard Announces discovery of Saturn's moon Tarqeq	 14 1629 - Astronomer Christiaan Huygens is born in The Hague Dutch Republic	Taxes Due 15 Venus conjunction with Pleiades	16 Lyrind meteors begin	17 1967 - NASA's spacecraft Surveyor 3 lands and takes first lunar samples	18 1732 - Louis Feuillie born
19 Eta Aquarids begin	20 1972 - Apollo 16, the 10th manned mission, lands on the lunar highlands	21 2002 - Huge coronal mass ejection caught by Solar Heliospheric Observatory	 Earth Day 22 Lyrids peak 182 zhr from Swift-Tuttle comet	23 1962 - Ranger IV is the first satellite to reach the lunar surface	24 TAA Public Observing Sylvan Prairie	25 Lyrids End TAA Public Observing Beaver Creek
26 1803 - An estimated 3,000 meteor fragments fall in L' Aigle, Normandy, France	27 1972 - Apollo 16 crew safely splashes down in Pacific Ocean	28 1928 - Geologist, astronomer and crater expert Eugene Shoemaker born	29 1946 - Polish astronomer Aleksander Wolszczan, is born	 30 1006 AD - Brightest supernova is recorded in China, Japan, and Iraq		



OTA: William Optics Redcat 51mm f/4.9

Focal Length: 250mm





Camera: DSLR Sony a7iii no filter

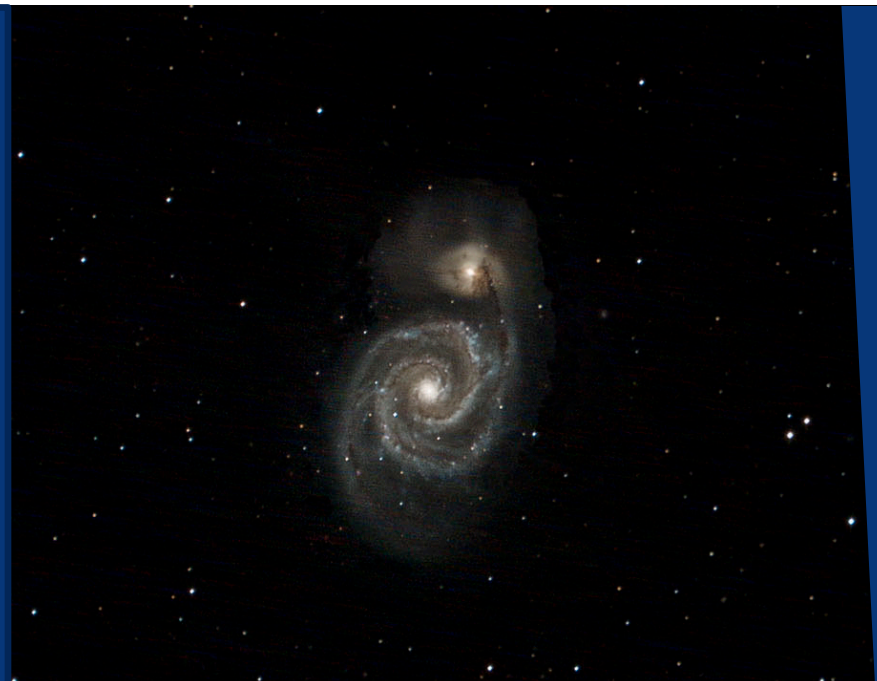
Total Exposure: 200 seconds

Sadr Region (IC1318)
Gamma Cygni Nebula
Constellation: Cygnus

This area contains a diffuse emission nebula that can be seen around the bright star Sadr (Gamma Cygni). Sadr is the star at the center of the Northern Cross, which marks the heart of the constellation Cygnus, the Swan. Despite the name, the star and the nebula are unrelated. Even though it looks embedded in the nebulosity, Sadr is approximately 1,800 light years distant, while the nebula is much further away, at 4,900 light years.

May 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 TAA Monthly Meeting 7:30PM UT McMaster 4009	Astronomy Day 2
3 1764 – Charles Messier finds M3 globular cluster	4 1989 – Magellan probe launched to Venus	5 1961 – Alan Shepherd first US man in space	6 ETA Aquarids peak 65 zhr from Halley's comet	 National Day 7 of Prayer Superior Full	8 1795 - French astronomer Jerome Lalande predicted the planet Neptune	9 1962 - MIT bounces a laser beam off the Moon to measure lunar distance
Mother's Day 10	11 1855 - A meteorite falls in Oesel, Estonia	12 1965 - Soviet LUNA 5 crashes onto the lunar surface	13 1999 - SETI Research Center launches SETI at Home Project	 Comet C/2017 T2 (PANSTARRS) is brightest ~ mag +7	15 1857 - Williamina Fleming born. Horse Head Nebula discoverer	16 1969 - Russia's Venera 6 sends atmospheric data from Venus
17 1818 – Ezra Otis Kendall, American astronomer and mathematician was born	18 1999 - Erich Karkoschka discovers Uranus' moon Perdita from Voyager 2	19 1826 - A meteorite falls in Pavlograd, Ukraine	20 1990 - Hubble Space Telescope's first image of binary star HD 96755	21 1911 – Williamina Fleming, Scottish-American astronomer died	 22 760AD - Halley's Comet has 14th recorded passage	23 1576 - Tycho Brahe is given Hveen Island to build the Uraniborg Observatory
24 1981 - Neptune's moon Larissa was discovered from Voyager 2	Memorial Day 25 240 BC - First recorded passage of Halley's Comet	26 2004 - Nikolas Chemykh dies. Soviet comet astronomer	27 1977 - Star Wars movie Episode IV "A New Hope" opens nation wide	28 ETA Aquarids end	 29 TAA Public Observing Sylvan Prairie	30 TAA Public Observing Beaver Creek
31 2001 - Cassini probe leaves Jupiter toward Saturn						



OTA: Celestron 14" Edge HD SCT with .7x reducer

Focal Length: 2737mm

Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Various Exposure Times

Upper Left: Galaxy (NGC 891)

An edge-on unbarred spiral galaxy 30 million light-years away. Constellation: Andromeda

Upper Right: Whirlpool Galaxy (M51)

Two interactive spiral galaxies approximately 23 million light-years from earth found in the constellation Canes Venatici





Bottom Left: Pinwheel Galaxy (M101)

A face-on spiral galaxy about 21 million light-years away found near the Big Dipper.

Bottom Right: Sculptor Galaxy (NGC 253)

An intermediate spiral galaxy about 30 million light-years in the constellation Sculptor

June 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 1714 - British astronomer Edmund Halley discovers Hercules Cluster	2 2003 - Mars Express launched by European Space Agency	3 1969 - Star Trek final telecast airs	4 1754 - Franz von Zach, Ceres hunter, is born	5  Penumbra Lunar Eclipse Europe, Asia, Australia & Africa	6 1838 - Three chunks of a chondrite meteorite fall in Chandakapur, India
7 1994 - Ulysses, the first solar powered probe to orbit all solar latitudes	8 2008 - NASA's New Horizons flies by the planet Saturn	9 1954 - A meteorite falls in Hokmark, Sweden	10 2003 - Neptunian moon Psamathe, discovered through Subaru Telescope	11 2008 - Fermi Gamma Ray Space Telescope launched	12 	13 Grand Canyon Star Party Jun 13-20
Flag Day 14 1988 - Pioneer 10 tested Einstein's Theory of Relativity about gravity waves	15 1903 - American E. E. Barnard finds a large white spot (storm) on Saturn	16 1989 - Neptune's moon Proteus discovered by Voyager 2 team	17 Rocky Mountain Star Stare Jun 17-21	18 Cherry Springs Star Party Jun 18-21	19 1989 - Neptune's moon Proteus discovered by Voyager 2 team	Summer Solstice 20 1764 - M23 Open Cluster discovered by Charles Messier
 Father's Day Annular Solar Eclipse Africa, China, Middle East	22 Bootid meteors begin. Variable from comet Pons-Winnecke	23 1881 - Great Comet C/1881 K1 discovered by John Tebbutt	24 1929 - American comet hunter Carolyn Shoemaker was born	25 1908 - George E. Hale detects a magnetic field in the Sun at Mt. Wilson	26 TAA Public Observing Sylvan Prairie	Bootids peak 27 TAA Public Observing Beaver Creek
 28 2011 - 4th moon of Pluto, Kerberos, is discovered	29 1868 - American telescope visionary George Ellery Hale was born	30 1861 - Chris Chatfield paints The Great Comet				



OTA: Celestron 11" SCT with Hyperstar f/2

Focal Length: 560mm





Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 441seconds

Trifid Nebula (M20)
with nearby Open Cluster (M21)
Apparent Magnitude: 6.3
Aprox. Distance: 5,200 light-years
Constellation: Sagittarius

The Trifid Nebula is a famous star-forming region and contains several objects: an emission nebula, a reflection nebula, a dark nebula and an open star cluster. The dark nebula, catalogued as Barnard 85, consists of dust clouds that block light from the objects behind them giving M20 its trifurcated look. M21 consists of small, faint stars and a few blue giants and lies just beyond naked eye visibility, but can easily be found in binoculars.

July 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 1847 - Karl Hendee discovers Asteroid 6 Hebe	2 Bootids end	3 Alpha Capricornid meteors begin	4 Independence Day  Partial Penumbral Lunar Eclipse
5	6 1938 - Neptune's moon Lysithea discovered by Seth Nicholson at Mt. Wilson	7 1988 - Soviets lose contact with their Mars PHOBOS I probe	8 1933 - Karl Jansky announces detection of radiation from our galactic center	9 1979 - Voyager 2 makes its closest approach to Jupiter	10 1682 - Roger Cote, maker of heliostat telescope with clock and revolving mirror was born	11 2012 - Styx, new moon of Pluto, discovered from New Horizons images
 So.Delta meteors begin	12 1972 - Large lunar quake recorded by seismometer placed on lunar surface	13 1965 - Mariner 4 flies by Mars and takes first close-up photo of another planet	14 1975 - first joint Soviet-United States human-crewed flight.	15 1969 - Apollo 11 is launched	16 Perseid meteors begin	17 1999 - Uranus' moon Prospero discovered by Matthew Holman
18 418 AD - First report of comet during solar eclipse seen by Philostorgius	19  1969 - Apollo 11 lands in Sea of Tranquility with Aldrin, Armstrong and Collins	20 1914 - Seth Nicholson discovers Jupiter's moon Sinope at Lick Observatory	21 1784- Friedrich Bessel an astronomer, develops parallax method	22 1995 - Comet Hale-Bopp discovered separately by Alan Hale and Thomas Bopp	23 TAA Public Observing Sylvan Prairie	24 TAA Public Observing Beaver Creek
25 1971 - First lunar vehicle is used by Apollo 15	26  1989 - Voyager 2 photos reveal Neptune's moons Despina & Galatea	27 1764 - M28 star cluster discovered by Charles Messier in Sagittarius	28 Alpha Capricornids peak 5 zhr from comet 9P/NEAT	29 So.Deltas peak 25zhr unknown source	30 1999 - Lunar Prospector launches with ashes of Gene Shoemaker onboard	31



OTA: Celestron 11" SCT with Hyperstar f/2

Focal Length: 560mm





Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 834 seconds

Andromeda Galaxy (M31)
Apparent Magnitude: 3.4
Aprox. Distance: 2.5 million light-years
Diameter: 220,000 light-years
Aprox. # of stars: 1 trillion

Andromeda is the nearest major galaxy to our own Milky Way and about double the size making it the largest Galaxy in our Local Group of galaxies. It has two dwarf satellite galaxies M32 (center right) and M110 (bottom left).

August 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 1818 - Maria Mitchell, first US female astronomer is born
2 2005 – MESSENGER probe launched for Mercury	3 	4 1181 - Chinese and Japanese see supernova naked eye in Cassiopeia	5 2012 - Curiosity lowered by 25-foot cables to Martian surface from hovering rocket	6 1618 - Johann Kepler presents his Second Law of Planetary Motion	7 1639 - Martin Van de Hove dies. Used telescopic visual angles for planetary diameters	8 2011 - NASA's probe Juno craft launches to the Jupiter system
9 1979 - The Soviets' last Luna Program is launched	10 1990 - NASA Magellan Mapper is inserted into Venus' orbit	11 	12 Perseids peak 60+zh from comet Swift-Tuttle	13 Venus greatest W. Elongation (AM) 2002 - Jupiter's moon Lomeida discovered	14 2002 - Neptune's moons Sao, Halimede, and Neso discovered	15 Alpha Capricornids End
16 1969 - Ticker tape parade for Apollo 11 crewmen is held in Houston, TX	17 1877 - Asaph Hall discovers Mars moon Phobos	18 	19 1787 - Saturn's moon Enceladus discovered by William Herschel	20 1975 - Viking launch becomes longest Mars surface mission at 2,307 days	21 1991 - Meteorite fall in Mount Tazerzat	22 TAA Picnic Beaver Creek
23 So.Deltas end	24 Perseids End	25  2003 - Hubble team discovers Neptune's moon, Cupid	26 1728 - Johann Lambert, theorist of the generation of the universe, is born	27 1962 - Mariner 2 is first robotic probe to pass within 21,607 miles of Venus	28 Alpha Aurigid meteors begin TAA Public Observ. Sylvan Prairie	29 TAA Public Observing Beaver Creek
30 1772 - 13,000 meteors seen in 1 hour from Comet Biela	31 Alpha Aurigids peak 6 zhr from comet Kiess					



OTA: Celestron 11" SCT with Hyperstar f/2

Focal Length: 560mm





Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 218 seconds

North American Nebula (NGC 7000)
Apparent Magnitude: 4
Aprox. Distance: 1,600 light-years
Constellation: Cygnus
Diameter: 1,800 light-years

This nebulous region covers an area more than four times the size of the full moon. The area along the bottom of the picture resembling Mexico and Central America is known as the Cygnus Wall.

September 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		 1 1804 Asteroid 3 Juno discovered by German Karl Harding	2 1998 - Soviets' Mars Phobos probe falls back to Earth with samples	3 1976 - Viking 2 lands on Mars	4 TAA Monthly Meeting 7:30PM at Univ. of Toledo McMaster Hall 4009	5 Alpha Aurigids end
6 1997 - Uranus' moon Caliban discovered by 200-inch Hale telescope team	Labor Day 7 1988 - UPI News Service reports the loss of Phobos I Russian Mars probe	8 1966 - Star Trek series premieres on TV	9 1789 - William Bond, the first director of Harvard Observatory, is born	 10 South Taurid meteors begin	11 1967 - Surveyor 5 lands on moon in Mare Tranquillitis, takes a total of 19,049 images	12 Okie-Tex Star Party Sep 12-20
13 1902 - A meteorite falls in Crymlyn, United Kingdom	14 1915 - Amateur astronomer John Dobson, Father of Sidewalk Astronomy, is born in Beijing	15 1965 - "Lost in Space" series airs on TV, runs for 3 seasons with 83 episodes	16 1848 - Saturn's moon Hyperion discovered	 17 Comet 88P/Howell reaches peak brightest ~ mag +9	18 1959 - Vanguard 3 launched to monitor Earth's magnetic field	19 Space Task Group moves from VA to Houston, TX
20 1970 - Soviet's Luna 16 gathers soil samples from Moon	21 1950 - English astrophysicist Edward Milne theorist of kinematic relativity, dies	Fall Equinox 22 1791 - British electromagnetic field expert Michael Faraday is born	 23 1846 - Johann Galle uses Urbain La Verrier's data and discovers Neptune	24 1970 - Luna 16 is first Soviet robotic lander to return moon sample	25 TAA Public Observing Sylvan Prairie	26 TAA Public Observing Beaver Creek
27 1918 - Sir Martin Ryle, radio astronomer who studied most distant galaxies, is born	28 1962 - Alouette 1 Canadian probe to check ionosphere launched	29 2004 - The asteroid 4179 Toutatis passes within four lunar distances of Earth	30 1880 - Henry Draper, amateur astronomer, photographs Orion Nebula, M-42			



OTA: Celestron 11" SCT with Hyperstar f/2

Focal Length: 560mm

Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Stacked and processed from a 30 second .AVI capture

Moon

Perigee: 362,600 km





Apogee: 405,400 km

Orbital period: 27d 7h 43min 11.5s

Apparent magnitude: -2.5 to -12.9 Full

The Moon is in synchronous rotation with Earth, and thus always shows the same side to Earth. This side is marked by dark volcanic maria that fill the spaces between the bright ancient crustal highlands and the prominent impact craters.

October 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	Orionid's begin 2 TAA Monthly Meeting 7:30PM at Univ. of Toledo McMaster Hall 4009	3 1962 - A 40-lb meteorite falls in Zagami, Nigeria 10 ft from farmer
4 1916 - Russian Cosmic ray theorist Vitaly Ginzburg was born	5 1827 - A howardite meteorite falls in Bialystok, Poland	6 1735 - British eyepiece designer Jesse Ramsden was born	7 1972 - Apollo 17 is last mission to land on moon	8 1873 - Ejnar Hertzsprung, Danish astronomer of Hertzsprung Russell Diagram, is born	 9 1604 - Kepler Supernova is most recent naked eye in supernova in our own Galaxy	10 South Taurids peak 5 zhr Comet Encke
11 1950 - A stony chondrite 23.8 lb meteorite falls in Vengerovo, Russia	Columbus Day 12 1994 - Magellan probe put to rest in Venus' atmosphere	13 1773 - Charles Messier discovers M51, the Whirlpool Galaxy	14 1761 - Jean Pons dies. He discovered 37 comets visually in his lifetime.	15 Heart of America Star Party Oct 15-18	 16 2006 - Mars Exploration Rover images Victoria Crater	17 1820 - Celestial mechanics astronomer Edouard Roche was born
18 1989 - Galileo Orbiter launched to Jupiter to study moons and magnetosphere	19 1910 - Indian astrophysicist Subrahmanyan Chandrasekhar born	20 North Taurid meteors begin	21 Orionids peak 25 zhr from comet Halley	22 2136 BC - Oldest Chinese recorded solar eclipse during reign of Chung K'ang	 23 TAA Public Observing Sylvan Prairie	24 TAA Public Observing Beaver Creek
25 1671 - Giovanni Cassini discovers Saturn's 3rd largest moon, Iapetus	26 1886 - A 99 lb meteorite falls in Kyushu, Japan	27 1780 - First astronomy eclipse expedition off eastern US coast	28 1835 - Francois Arago observes polarized light in tail of Halley's Comet	29 1905 - An eucrite or feldspar meteorite falls in Bholghati, (eastern) India	30 1938 - Orson Welles' "War of the Worlds" radio show about an alien invasion causes panic	 Halloween 31 1944 - NASA's Jet Propulsion Labs in Pasadena, CA opens doors



OTA: Celestron 14" Edge HD SCT with Hyperstar f/1.9

Focal Length: 684mm





Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 1320 seconds

Elephant Trunk Nebula (IC 1396)
Aprox. Distance: 2,400 light-years
Constellation: Cepheus

The Elephant's Trunk Nebula is a concentration of interstellar gas and dust recently discovered to be an area of star formation.

November 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Daylight Saving Time ends 1	2 1917 -First light from 100-inch Hooker telescope at Mt. Wilson in CA	Election Day 3 1955 - Meteorite strikes and bruises woman in Alabama	4 1877 - David Todd at US Naval Observatory starts search for planet X	5 1967 - First color picture of Earth from space	Leonid's begin 6 TAA Monthly Meeting 7:30PM at Univ. of Toledo McMaster Hall 4009	7 Orionids end
 8 1742 - Astronomer, physicist Edmund Halley is born in England	9 1934 - American astronomer, cosmologist, Carl Sagan is born	10 1967 - Surveyor 6 lunar lander launches for the moon	Veterans Day 11 1935- First photo of Earth's curvature from balloon at 72,000 feet	12 North Taurids peak 5 zhr comet Encke	13 1978 -Einstein Observatory launched to image quasars and other X-ray sources	 14 1969 - Apollo 12 lands in Sea of Storms
15 1738 - telescope maker, William Herschel is born	16 1965 - Soviets' Venera 3 is first probe to visit another planet, Venus	17 Leonids peak 15 Zhr from comet Temple Tuttle	18 1989 - Cosmic Background Explorer launched to study microwave radiation	19 1711 - Russian Mikhail Lomonosov, discoverer of Venus' atmosphere, is born	20 South Taurids End	 21
22 1973 - Chad Trujillo, co-discoverer of Eris and other trans-Neptunian objects, was born	23 1924 - Edwin Hubble's Theory of Expanding Universe is published	24 1639 - Jeremiah Horrocks makes helioscope to safely view the transit of Venus	25 1930 - A stony-iron meteorite left a 46cm deep and 1 meter wide crater in Karoonda, Australia	Thanksgiving 26 2011 - Mars Science Laboratory spacecraft with rover Curiosity is launched	27 1885 - Earliest Antarctic meteorite photo taken of the 40 lb specimen	28 1659 - astronomer Christian Huygens sketched his first markings of Martian surface
29 Partial Penumbral Lunar Eclipse	 30 Leonids end					



OTA: Celestron 11" SCT with .63x reducer

Focal Length: 1764mm

Camera: ZWO ASI 294MC Pro with ZWO IR cut filter

Total Exposure: 2080 seconds

Helix Nebula (NGC 7293)
Apparent Magnitude: 7.6
Aprox. Distance: 650 light-years
Constellation: Aquarius

The Helix is the currently the largest known planetary nebula and also one of the closest nebula to earth. It has sometimes been referred to as the "Eye of God" in pop culture, as well as the "Eye of Sauron"

December 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 1959 - First color photograph taken of Earth from Thor missile	2 1989 - Solar Max satellite mission ended	3 1973 - Pioneer 10 was first craft to fly by Jupiter on way to Saturn	4 Leonid's begin TAA Monthly Meeting 7:30PM at Univ. of Toledo McMaster Hall 4009	5 2001 - Enrico Fermi stamp released by US Postal Service
6 1958 - Pioneer 3 falls back to Earth after reaching an altitude of 102,360 km	 7 Geminid meteors begin	8 1995 - Atlantis Space Shuttle launched the Jupiter Galileo Orbiter	9 1858 - 110lb Meteorite fall in Ausson, France	10 North Taurids end	11 1863 - Star spectral astronomer Annie Cannon born	12 1961 - First amateur radio satellite OSCAR 1 launched
13 Geminids peak 120 zhr from asteroid 3200 Phaethon	 14 Total Solar Eclipse - Chile & S. Argentina	15 1966 - French astronomer Audouin Dollfus discovers Saturn's moon Janus	16 1969 - Adam Riess, theorist of accelerating universe expansion, is born	17 Geminids end Ursid meteors begin	18 1966 - Walker, Fountain and Larson co-discover Saturn's moon Epimetheus was born	19 1893 - Funding attained for Planet X search at Lowell Observatory
20 1900 - Comet 21P/Giacobini-Zinner discovered and again in 1923 by Zinner	 Winter Solstice Jupiter - Saturn Great Conjunction	22 Ursids peak 10 zhr from 8/P/Tuttle	23 1672 - Astronomer Giovanni Cassini discovers Saturn's moon Rhea	24 1968 - Apollo 8 astronauts read story of creation from Bible	25 Christmas 1642 - Isaac Newton born in Woolsthorpe England	26 Ursids end
27 1630 - German Johannes Kepler, known for laws of planetary motion, was born	28 Quadrantid meteors begin 120 zhr from asteroid 2003 EH	 29	30 2000 - Cassini-Huygens probe sends back images of Saturn	31 New Year's Eve 1864 - Double star cataloguer Robert Aitken from Lick Observatory was born		

2020 Amateur Astronomer Star Parties / Festivals / Conferences

Date	Name	Location	Website
Feb 17-23	Winter Star Party	Camp Wesumkee, Florida Keys	scas.org
Feb 21-22	Death Valley Star Party	Death Valley, California	lvastronomy.com
March -TBA	The Triad Starfest - aka. TriStar	North Carolina	catawbasky.org / gtcc.edu
April 2-3	NEAIC	Suffern, New York	rocklandastronomy.com
April 4-5	NEAF	Suffern, New York	rocklandastronomy.com
April 22-25	MidSouth Star Party	French Camp, Mississippi	rainwaterobservatory.org
April 24-26	Michiana Star Party	Vandalia, Michigan	michiana-astro.org
April - TBA	Southern Star Astronomical Convention	Little Switzerland, North Carolina	charlotteastronomers.org
April - TBA	South Jersey Astro Club Spring Star Party	Belleplain State Forest, New Jersey	sjac.us/starparty.html
May 2	ASTRONOMY DAY	EVERYWHERE	astroleague.org/al/astroday/astrodayform.html
May 14-24	Texas Star Party	Fort Davis, Texas	texasstarparty.org
June 11-14	Bootleg Spring Star Party	Harmon, Illinois	bootlegastronomy.com
June 13-20	Grand Canyon Star Party	North Rim, Kaibab Lodge 2020, Arizona	saguaroastro.org
June 17-20	Green Bank Star Quest	Green Bank, West Virginia	greenbankstarquest.org
June 17-21	Rocky Mountain Star Party	Gardner, Colorado	rmss.org
June 17-20	Bryce Canyon Astronomy Festival	Bryce Canyon National Park, Utah	www.nps.gov/brca/planyourvisit/astrofest.htm
June 18-21	Cherry Springs Star Party	Cherry Springs State Park, Pennsylvania	facebook.com/CherrySpringsStarParty
June 18-20	WOW - Wisconsin Observers Weekend	Waupaca, Wisconsin	new-star.org
June 20-24	Golden State Star Party	Bieber, California	goldenstatestarparty.org
July - TBA	Manitoulin Star Party	Manitoulin Island, ON	gordonspark.com/starparties/
July 19-24	Nebraska Star Party	Merritt Reservoir, Valentine, Nebraska	nebraskastarparty.org
Aug 14-23	Summer Star Party	Plainfield, Massachusetts	rocklandastronomy.com
Aug 14-18	Almost Heaven Star Party	Spruce Knob, WV	ahsp.org
Aug 16-22	Maine Astronomy Retreat	Washington, ME	astronomyretreat.com
Aug 20-23	Thebacha & Wood Buffalo Dark Sky Festival	Fort Smith, Northwest Territory, Canada	www.tawbas.ca
Aug 21-23	Northwoods Starfest	Hobbs Observatory, Fall Creek, Wisconsin	cvastro.org

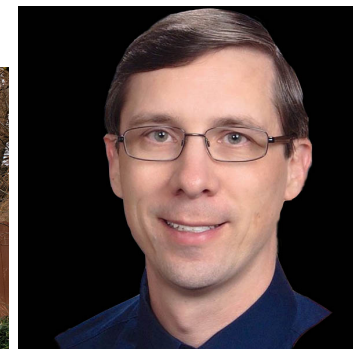
Aug - TBA	Starfest	Ayton, Ontario, Canada	nyaa.ca
Aug/Sept - TBA	Saskatchewan Star Party	Cypress Hills Interprovincial Park, Saskatchewan	sssp.saskatoon.rasc.ca
Aug/Sept - TBA	Northern Nights Star Fest	Palisade, Minnesota	mnastro.org/northern-nights-star-fest
Sept 11-13	Connecticut River Vallet Astro Conjunction	Northfield, Massachusetts	philharrington.net/astroconjunction
Sept 16-20	Acadia Night Sky Festival	Cadillac Mountain, Maine	acadianightskyfestival.org
Sept 12-20	Okie-Tex Star Party	Camp Billy Joe, Kenton, Oklahoma	okie-tex.com
Sept 17-20	Bootleg Fall Star Party	?, Illinois	bootlegastronomy.com
Sept 17-20	Great Lakes Star Gaze	River Valley RV Park, Gladwin, Michigan	greatlakesstargaze.com
Sept 17-21	Iowa Star Party	Whiterock Conservancy - Coon Rapids, Iowa	iowastarparty.com
Sept 18-20	Alberta Star Party	Starland Recreation Area, Alberta Canada	calgary.rasc.ca/asp2020.htm
Sept 18-20	Connecticut Star Party	Camp Strang, Goshen, Connecticut	asnh.org/slideshow/CSPpicIndex.php
Sept 18-20	Eastern Iowa Star Party	St Ambrose Univ. Menke Observatory, Dixon, Iowa	facebook.com/Eastern-Iowa-Star-Party-592158137834252/
Sept – TBA	Hidden Hollow Star Party (3 days)	Warren Rupp Observatory, Mansfield, Ohio	wro.org/hidden-hollow-star-party/
Sept – TBA	Astronomy at the Beach (2 days)	Island Lake State Rec. Area, Brighton Michigan	glaac.org/astronomy-at-the-beach/
Sept – TBA	Last Chance Star Party	Restoule Provincial Park, Ontario, Canada	gatewaytotheuniverse.org
Sept / Oct - TBA	NOVAC Stargaze (1 day)	C. M. Crockett Park, Virginia	novac.com/wp/
Oct 10-18	Pennyrile Stargaze	Hopkinsville, Kentucky	facebook.com/southstarparty
Oct 15-17	Illinois Dark Skies Star Party	Chandlerville, Illinois	sas-sky.org
Oct 15-18	Heart of America Kansas Star Party	75 miles South of Kansas City	askc.org/events/hoasp
Oct 16-25	Jasper Dark Sky Festival	Jasper National Park, Alberta, Canada	jasperdarksky.travel
Oct - TBA	Staunton River Star Party	Staunton River St. Park, Halifax County, Virginia	chaosastro.org/starparty
Oct - TBA	Enchanted Skies Star Party	Magdalena, New Mexico	enchantedskies.org
Oct - TBA	South Jersey Astro Club Fall Star Party	Belleplain State Forest, New Jersey	sjac.us/starparty.html
Oct - TBA	Deep South Star Gaze	Sandy Hook, Mississippi	stargazing.net/DSRSG/
	Various small parties year round	Restoule Provincial Park, Ontario, Canada	gatewaytotheuniverse.org
Find even more events at skyandtelescope.com/astronomy-events			

Opening in 2020 – The Genesis Home Observatory

41° 39' 40" N / 83° 36' 11" W Bortel Class 8

Thanks to everyone who helped with this project especially my wife! I named it 'Genesis' because it is my first observatory and also because of my faith in God.

"In the beginning God created the heavens and the earth." (Genesis 1:1)



My Equipment Specs

Optical Tube Assemblies		Cameras	
William Optics Redcat 51 	OTA Type Petzval APO Refractor Aperture 51mm Focal Length 250mm Focal Ratio f/4.9 Weight 3 lbs	Sony A7iii DSLR DSLR Full Frame Mirrorless 	CMOS Sony Emor R 33mm Sensor size 35.6mm x 23.8mm Pixel Size in Microns 5.91 Resolution 6000 x 4000 (24.2 MP) Bit Depth 14bit RAW 8bit jpeg
Rokinon 135mm 	OTA Type 11 Glass elements in 7 Groups Aperture Full frame Focal Length 135mm Focal Ratio f/2.0 to f/22 Weight 1.85 lbs	ASI 294MC Pro 	Sensor size 19.19mm x 13.07mm Pixel Size in Microns 4.63 Resolution 4144 x 2822 (11.7 MP) Full well capacity 63700e QuantumEfficiency: > 75% Bit Depth 14-Bit
Mead Coronado SolarMax III Double Stack Solar Scope 	OTA Type Achromatic Refractor Blocking Filter 15mm Aperture 70mm Focal Length 400mm Focal Ratio f/5.7 Weight 9.5lbs	ASI 290MC Pro 	Sensor size 5.61 mm x 3.18mm Pixel Size in Microns 2.9 Resolution 1936 x 1096 (2.1 MP) Full well capacity 14600e QuantumEfficiency 80% Bit Depth 12-bit
Celestron CPC 1100 With fixed Alt-Az mount 	OTA Type Schmidt-Cassegrain Focal Length 2800mm, 1764mm, 560mm Focal Ratio f/10, f/6.3, f/2 hyperstar Aperture 279mm / 11" Highest Magnification 661x Weight 65lbs	Versatile Mounts	
Celestron 14" SCT Edge HD 	OTA Type Aplanatic Schmidt-Cassegrain Focal Length 3910mm, 2737mm, 684mm Focal Ratio f/11, f/7.7, f/1.9 hyperstar Aperture 356mm / 14" Highest Magnification 840x Weight 46lbs	SkyWatcher AZ-GTI 	Alt-AZ or Equatorial modes SynScan GoTo technology 42,900+ objects Mounting Saddle Type: Vixen Weight Fully Assembled: 8.6 lbs. Payload Capacity: 11 lbs.
		iOptron CEM 120 	Center Balanced Equatorial mount Go2Nova GoTo technology Mounting Saddle Type: Losmandy D Weight Fully Assembled: 57 lbs. Payload Capacity: 120 lbs.