



Ephemeris

The Official Newsletter of the Prescott Astronomy Club (PAC)
e-phem-er-is: a time-based listing of future positions of solar system objects.

June 2023



Original Photo: Lucas Pezeta

General Meeting of the Prescott Astronomy Club

Wednesday, June 7, 2023 at 6:00pm
Prescott Public Library - Founders Room

Speakers: Joshua Ballze & Manuel Lucero, Museum of Indigenous People
Topic: Indigenous Skies

Background: Joshua Ballze and Manuel Lucero of the Museum of Indigenous People will present their research and findings on the archaeology of astronomy and the history of Indigenous cosmology. Their talk will cover a range of topics from Sinagua petroglyphs depicting supernovas to Chumash star charts and Cherokee stories of meteors and much more.

Bio: Joshua Ballze (Hia-Ced O'Odham, Tarahumar) is a scientific illustrator for various museum institutions and is a Board of Trustee member at the Museum of Indigenous People. Manuel Lucero (Cherokee) is the Executive Director for the Museum of Indigenous People and has an extensive educational background in American Indian Studies.

General Meeting of the Prescott Astronomy Club

Wednesday, July 5, 2023 at 6:00pm
Prescott Public Library - Founders Room

Speakers: Dr. Justin Haggerty, USGS Astrogeology Science Center
Topic: Rise of the USGS in Planetary Exploration

Background: A discussion of the past, current, and future activities of the USGS Astrogeology Science center in relation to the exploration of our Solar System. The USGS Astrogeology Science Center, conducts innovative, fundamental research that advances the fields of planetary spatial data infrastructure, geoscience, and remote sensing. The talk will include a discussion of the Astronaut training program and involvement in planetary spacecraft missions.

Bio: Dr. Justin Haggerty is the Director at the USGS Astrogeology Science Center, in Flagstaff.

General Meeting of the Prescott Astronomy Club

Wednesday, August 5, 2023 at 6:00pm
Prescott Public Library - Founders Room

Swap Meet: Bring your own gear to SELL or TRADE! Also featuring items from the club's inventory including telescopes, astronomy equipment, accessories and books.

Member Presentations: Volunteer to present information about your recent astronomy activities. Show your astrophotos, present an astro trip report, or talk about a recent interesting observation.

Bio: Dr. Justin Haggerty is the Director at the USGS Astrogeology Science Center, in Flagstaff.

General Meeting of the Prescott Astronomy Club

Wednesday, September 8, 2023 at 6:00pm
Prescott Public Library - Founders Room

Speakers: Dr. Nick Moskovitz, Lowell Observatory, Flagstaff, Arizona

Topic: Earth strikes back: NASA's first planetary defense experiment (DART follow-up)

Background: Late 2022 NASA's DART spacecraft deliberately crashed into an asteroid at a speed of more than 13,000 mph. Given this dramatic end, ground based telescopes, including several at Lowell Observatory, will be tasked with witnessing the aftermath. I will discuss background to the DART mission, what is expected to happen, and why smashing into things in outer space can be fun.

Bio: Dr. Nick Moskovitz is an astronomer at Lowell Observatory in Flagstaff, Arizona. He has degrees from the University of California at Santa Barbara (BS Physics) and the University of Hawaii (PhD Astronomy). His research is related to small bodies in the Solar System with active projects involving video observations of meteors, curation of an asteroid database (asteroid.lowell.edu), and observations of near-Earth asteroids.

Grand Canyon Star Party 2023

June 10-17

- Attend this free, open to the public, event. The [park entrance fee](#) is good on both South and North rims for 7 days. No additional tickets or sign-up is required.
- The event begins at sunset, although the best viewing is after 9 pm and many telescopes come down after 11 pm; however, on nights with clear, calm skies, some astronomers continue sharing their telescopes into the night.
- [Campground](#) or [lodging](#) reservations are recommended.
- Dress warmly. Temperatures drop quickly after sunset — even during summer months.
- View an assortment of planets, double stars, star clusters, nebulae and distant galaxies by night, and perhaps the Sun or Venus by day.
- Skies will be starry and dark until the moon rises the first night. It rises progressively later throughout the week of the Star Party.

See <https://www.nps.gov/grca/planyourvisit/grand-canyon-star-party.htm> for more information.



NASA Night Sky Notes

Original Photo: unknown

Look Up in the Sky — It's a Bird

By Theresa Summer

Bird constellations abound in the night sky, including **Cygnus**, the majestic swan. Easy to find with its dazzling stars, it is one of the few constellations that look like its namesake, and it is full of treasures. Visible in the Northern Hemisphere all summer long, there's so much to see and even some things that can't be seen. To locate Cygnus, start with the brightest star, **Deneb**, also the northeastern most and dimmest star of the Summer Triangle. The Summer Triangle is made up of three bright stars from three different constellations — read more about it in the September 2022 issue of Night Sky Notes. "Deneb" is an Arabic word meaning the tail. Then travel into the triangle until you see the star **Albireo**, sometimes called the "beak star" in the center of the summer triangle. Stretching out perpendicular from this line are two stars that mark the crossbar, or the wings, and there are also faint stars that extend the swan's wings.

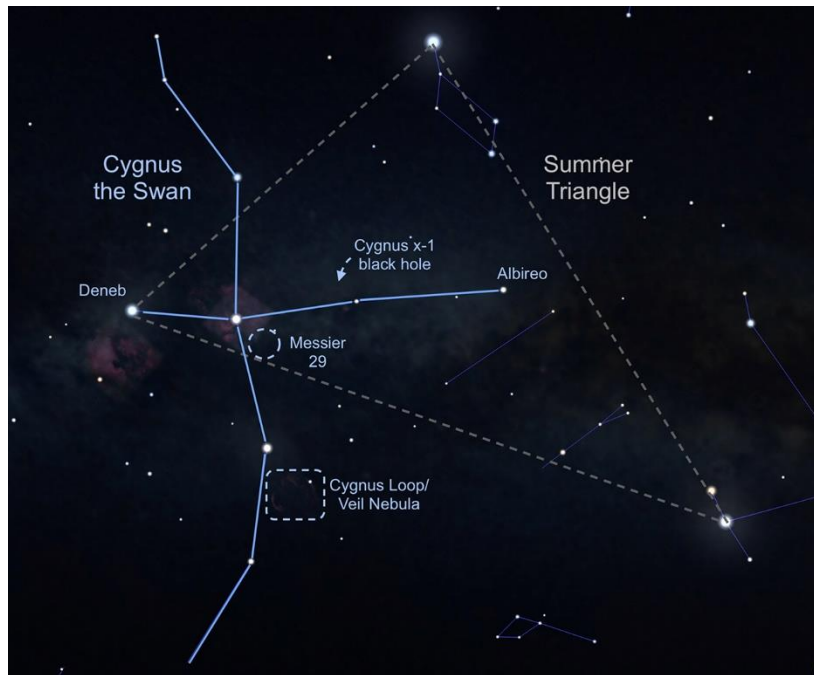


Image created with assistance from: Stellarium, stellarium.org.

Look up after sunset during summer months to find Cygnus! Along the swan's neck find the band of our Milky Way Galaxy. Use a telescope to resolve the colorful stars of Albireo or search out the open cluster of stars in Messier 29.

From light-polluted skies, you may only see the brightest stars, sometimes called the Northern Cross. In a darker sky, the line of stars marking the neck of the swan travels along the band of the **Milky Way**. A pair of binoculars will resolve many stars along that path, including a sparkling open cluster of stars designated **Messier 29**, found just south of the swan's torso star. This grouping of young stars may appear to have a reddish hue due to nearby excited gas.

Let's go deeper. While the bright beak star Albireo is easy to pick out, a telescope will let its true beauty shine! Like a jewel box in the sky, magnification shows a beautiful visual double star, with a vivid gold star and a brilliant blue star in the same field of view. There's another marvel to be seen with a telescope or strong binoculars — the Cygnus Loop. Sometimes known as the **Veil Nebula**, you can find this supernova remnant (the gassy leftovers blown off of a large dying star) directly above the final two stars of the swan's eastern wing. It will look like a faint ring of illuminated gas about three degrees across (six times the diameter of the Moon).



Image Credit: NASA/CXC chandra.harvard.edu/photo/2011/cygx1/.

While the black hole Cygnus x-1 is invisible with even the most powerful Optical telescope, in X-ray, it shines brightly. On the left is the optical view of that region with the location of Cygnus x-1 shown in the red box as taken by the Digitized Sky Survey. On the right is an artist's conception of the black hole pulling material from its massive blue companion star.

Speaking of long-dead stars, astronomers have detected a high-energy X-ray source in Cygnus that we can't see with our eyes or backyard telescopes, but that is detectable by NASA's Chandra X-ray Observatory. Discovered in 1971 during a rocket flight, Cygnus x-1 is the first X-ray source to be widely accepted as a black hole. This black hole is the final stage of a giant star's life, with a mass of about 20 Suns. Cygnus x-1 is spinning at a phenomenal rate — more than 800 times a second — while devouring a nearby star. Astronomically speaking, this black hole is in our neighborhood, 6,070 light years away. But it poses no threat to us, just offers a new way to study the universe.

Check out the beautiful bird in your sky this evening, and you will be delighted to add Cygnus to your go-to summer viewing list. Find out NASA's latest methods for studying black holes at www.nasa.gov/black-holes.

Backyard Astronomer



Original Photo: Eberhard Grossgasteiger

The Backyard Astronomer - May 2023

Buzzing Bees and Planets

By Adam England, The Backyard Astronomer



Image Credit: Beehive Cluster courtesy NASA, photographer Drew Evans.

Spring also brings with it the pollinators that make our world possible, and the Beehive Cluster shines prominent in the sky this month. You may be able to spot these industrious little lights “buzzing” around Mars on the night of June 2nd, when the Red Planet will be centrally located among this open cluster. Mars is easy to spot, being one of the most crimson objects in the night sky and should help you locate the beehive cluster above the Southwestern horizon just after dusk. On many nights, and from dark skies, it is easy to locate with the naked eye, as astronomers and observers have done for millennia. A handful of stars have always been visible to the eye; however, Galileo turned his telescope to the cluster in 1609 as one of his first observations and was able to discern 40 individual stars. Modern observations have catalogued over 1000 stars that are gravitationally linked in this area of space with a radius of about 12 light years, with around 30% of the stars being Sun-like.



Image Credit: Beehive Cluster location 06/06/2023 at 8PM MST, courtesy SkySafari.

Just as our bees are busy spreading life around our planet, the stars in the Beehive Cluster too are busy forming new planets of their own. In 2012 researchers using the Kepler Space Telescope announced that two planets had been discovered orbiting two separate stars in the cluster. Known as “Hot Jupiters” these planets are some of the largest gas giants, though they orbit much closer to their host star, making them — you guessed it — much hotter. While this is not in itself a unique discovery in this age of planets, what is unique is that both of the stars they orbit are similar in size and brightness to our own star. From our limited observations since the first exoplanet discovery in 1992 we have found 9432 exoplanets, with less than 5% being rocky, earth like bodies, and K type “orange dwarf” stars being the most common type of star to host a planet. By comparison, our Sun is a G type yellow dwarf, being slightly larger and hotter.



Image Credit: This is an additional image of the beehive cluster imaged by Prescott Astronomy Club member Joel Cohen from Prescott Valley.

If you missed the conjunction of Mars and the Beehive Cluster on June 2nd, you could witness an earth-like planet join the cluster on the nights of June 12th and 13th. Earth's celestial twin, Venus, will be making a close approach to the cluster as it traverses the ecliptic. Though separated by millions of miles of empty space, both of these wanderers appear to move along the same cosmic road, as determined by our solar system's formation out of a disk of gas and dust, and few planets have strayed more than a few degrees from this original stellar plane.

Adam England is the owner of Manzanita Insurance and Accounting and moonlights as an amateur astronomer, writer, and interplanetary conquest consultant. Follow him @ Facebook.com/ BackyardAstronomerAZ and Instagram.com/TheBackyardAstronomerAZ.

Celestial Calendar

Original Photo: Camille Cox

June 2023:

This calendar is from In-The-Sky.org & shows objects & events visible during June 2023.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2 Great Globular Cluster in Hercules is Well-Placed	3 Close Approach of Mars & M44 Lunar Occultation of Delta Scorpii Messier 12 is Well-Placed
4	5 Moon at Aphelion	6	7 Moon at Perigee	8	9	10 Close Approach of Moon & Saturn

Venus at Dichotomy Full Strawberry Moon Conjunction of Mars & Uranus Mercury at Dichotomy Venus at Greatest Elongation East		Asteroid 11 Parthenope at Opposition Messier 10 is Well-Placed	Messier 62 is Well-Placed		Conjunction of Moon & Saturn	Last Quarter Moon
11 Daytime Arietid Meteor Shower 2023 Messier 92 is Well-Placed	12	13 Mercury at Highest Altitude (Morning)	14 Close Approach of Venus & M44 Close Approach of Moon & Jupiter Conjunction of Moon & Jupiter	15	16 Conjunction of Moon & Mercury NGC 6388 is Well-Placed	17 Moon at Perihelion Saturn in Retrograde Butterfly Cluster is Well-Placed NGC6397 is Well-Placed
18 New Moon Cluster IC 4665 is Well-Placed	19	20 Ptolemy Cluster is Well-Placed	21 Summer Solstice	22 Conjunction of Moon & Venus Close Approach of Moon & Venus Conjunction of Moon & Mars Close Approach of Moon & Mars Moon at Apogee	23 Lagoon Nebula is Well-Placed	24 NGC 6541 is Well-Placed
25	26 First Quarter Moon	27 Mercury at Perihelion June Bootid Meteor Shower 2023	28	29 Cluster NGC 6633 is Well-Placed	30 Neptune in Retrograde Lunar Occultation of Delta Scorpii	



Original Photo: Rajesh S. Balouria

Astronomy Apps

By Hilary Legacy

I hope you enjoyed last month's review of the app [Eclipse Guide](#). There are many astronomy apps available on both the Apple & Android platforms, but not all are created equal. Each offers different functions & information, each with a different design & style. Some focus on constellations & stars, others on the moon, yet others on education. I'll begin with the ones I have, one per month, & then other apps will follow in the next issues.

NASA App

This app by NASA includes video, audio & many other types of media related to their missions. There are items in the following categories: All News (includes highlights on projects, awards, educational programs); Images (planets, moons, nebula, galaxies); TV & Audio (NASA TV Public, NASA TV Media, ISS News, Radio & Podcasts); Videos (including missions, launches, partners, upgrades); Missions, Schedule & Sightings (including Artemis, Hubble, Juno, James Webb, Perseverance Rover); Tweets (NASA's Twitter feed); & Featured News (including ISS Finder & Night Sky Explorer, Solar System Exploration, NASA Eyes [interactive features], 3D Models, James Webb Space Telescope & First

Images). Each contains stories or other content about NASA missions & other space news. The articles are well-written & the images, audio & video are incredible & high quality! I'd highly recommend this app for those interested in NASA projects & news.

I hope these give you a good look at some of the astronomical apps out there!



Original Photo: Egil Sjøholt

We'd Love Your Photos & Ideas for the Newsletter!

I am requesting any & all photographer members of PAC to submit astronomical &/or sky photographs to share with all the members by their inclusion in Ephemeris. Images can be sent to Hilary Legacy at ed@prescottastronomyclub.org. Please include descriptions of equipment, cameras, image capture parameters & processing, as well as what's in the image & when & where you took it. Or, for anyone who likes to photo edit or make their own images, I'd love to hear from you too. Thanks!

I'm also asking for anyone with ideas of things we could put in our newsletter to contact me. If there's something you'd like to see here, then tell me about it. Email Hilary Legacy at ed@prescottastronomyclub.org.



Original Photo: Joonas Kääriäinen

Observing lists are available in PDF format on the PAC website to provide guidance & goals for visual & astrophotography programs. These lists graciously provided by Past President David Viscio to assist in planning your observation activities. The lists are in PDF format and may be viewed, downloaded or printed with the permission of David Viscio.

Astroleague Lunar 100
Bright Nebulae Dunlop 100.
Globular Clusters
Messier
Planet Maps

Binocular Showpieces Caldwell
Face-On Spiral Galaxies
Herschel II
Herschel 400

Royal Astronomical Society of Canada Finest NGC Saguaro Astronomy Club Best NGC S&T

SCAVENGER HUNTS IN THE SKY

Lists for Any Occasion

Need ideas for your visual or astrophotography program? We have you covered with observing lists for your personal exploration or use at a star party. Click on the links below to open an observation list in another window to view or print it.

[Astroleague Lunar 100](#)

[Astroleague Urban](#)

[Binocular Showpieces](#)

[Bright Nebulae](#)

[Caldwell Objects](#)

[Double Stars](#)

[Dunlop 100 \(Southern Hemisphere\)](#)

[Face-On Spiral Galaxies](#)

[Globular Clusters](#)

[Herschel 400](#)

[Herschel II](#)

[Hidden Treasures](#)

[Messier Objects](#)

[Open Clusters](#)

[Planet Maps](#)

[Planetary Nebulae](#)

[RAS of Canada Finest NGC](#)

[Saguaro Astronomy Club Best NGC](#)

[Secret Deep](#)

[Space & Telescope Lunar 100](#)

[Telescope Showpieces by Month](#)



Original Photo: Samer Daboul

These are photographs from non-PAC members that you might enjoy.

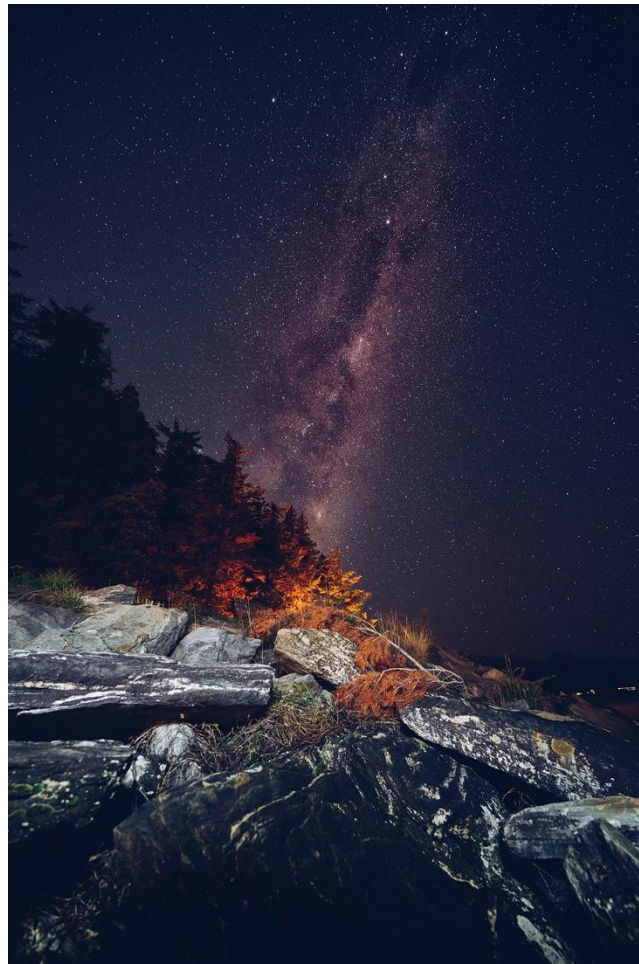


Photo Credit: Alexandra Karnasopoulos.



Photo Credit: Alex Andrews.



Original Photo: Tobias Bjørkli

PAC Board of Directors:

President: Art Arnold-Roksandich
Vice-President: Brian Blau
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PAC Coordinators:

Astronomical League Coordinator: Ken Olson
Christmas Party: Susanne Vaughan
Equipment Loans: Roland Albers
Membership: Roland Albers
METASIG: John Dwan
Newsletter: Hilary Legacy
Night Sky Network: Open
Outreach Coordinator: Brian Blau
Refreshments: Open
Speakers: Lisa Anderson
Starry Nights Coordinator: Brian Blau
Summer Picnic: Doug Tilley
Webmaster: EJ Van Horne

PAC Contact Information:

Website: <http://www.prescottastronomyclub.org>
Email: pacinfo@prescottastronomyclub.org

PAC Mentors:

If you need advice on the purchase of astronomy equipment, setting up equipment, astrophotography, etc., contact a PAC mentor.

Astrophotography: Brian Blau
General & Astrophotography: David Viscio
Visual Observation: Greg Lutes



Need to Know?

Original Photo: Jeremy Müller

Ask a Member!

A 15-minute segment is being added to the regular general meetings where members can have their burning questions answered by other knowledgeable members. If you have an astronomy-related question you would like answered, submit it to Art Arnold-Roksandich at p@prescottastronomyclub.org. You can also bring up the question at the meeting.