

AOH Newsletter

Autumn 2024



News and Notes

AOH Summer Activities



AOH had a productive Summer (after a string of consecutive scheduled but clouded-out events over the Winter and Spring). Our four Zoom meetings were primarily devoted to planning the outreach and service events of the season.

Pal Camp

On June 26 we met with 60 kids and counselors at the Discovery Museum's day camp at Pal Camp in Freshwater. We had hoped to observe sunspots, but it was overcast, so we fell back to our cloudy-day activities. We used photos and the magnetic sun toolkit to discuss solar activity. We

Left: Our summer Zoom meetings. See if you can identify Allison, Ann, Ashley, Bernie, Brent, Catrina, Grace, Johann, Joy, Ken, Mark, Mary, Rick, Roger, Russ, Susan, and Yoon.

gave a telescope demonstration by observing a moon poster from across a field. In small groups, we talked about the Solar System using photographs and scale models of the planets. With our planetary tape measure, we had the kids pace off the relative distances from the sun to the planets. And indoors, using a bright light and the shadows and silhouettes toolkit, we demonstrated lunar and solar eclipses.



Clockwise from the top: Ken, Brent, Grace, and Russ and their toys. Kids lined up for a turn at the telescope. Ken playing "guess which planet this is" with a collection of NASA photos. Photos by Catrina Howatt.

Albee Creek

AOH, along with the Humboldt Redwoods Interpretive Association, hosted three Star Parties at Albee Creek Campground in Humboldt Redwoods State Park this past Summer. The dates were June 29, July 27, and August 24. AOH volunteers were Allison (3), Bernie (2), Brent (2), Catrina (2), Connor, David, Grace, Jeff, Johann (3), Ken, Lisa, Mark, Mary (3), Roger (3), Russ (2), Susan C (3), Susan T, and Yoon. In addition Mary organized a huge turnout of HRIA volunteers.

There were 160, 222, and 145 visitors at the three events.

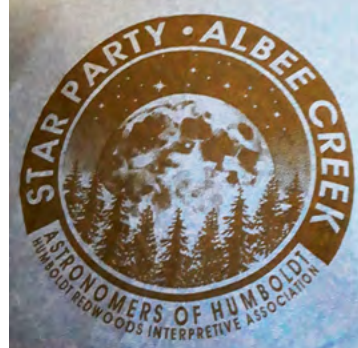
We had good skies, and the visitors were awed by views of binary stars, nebulae, galactic clusters, and galaxies. At each event Allison gave an informative and entertaining star talk. And at the end of the evening in August we even got a glimpse of Saturn peeking through the redwoods.

Photos below are from June, taken by Catrina Howatt (top and bottom left) and Johann Waltberg (bottom right).





Photo at top left is from July by Allison Waltberg. Bottom left is from August by Allison Waltberg. At right, photo from August by Johann Waltberg. Below, photo from August by Allison Waltberg. T-shirt design is by Mary Kaufman.



Kneeland

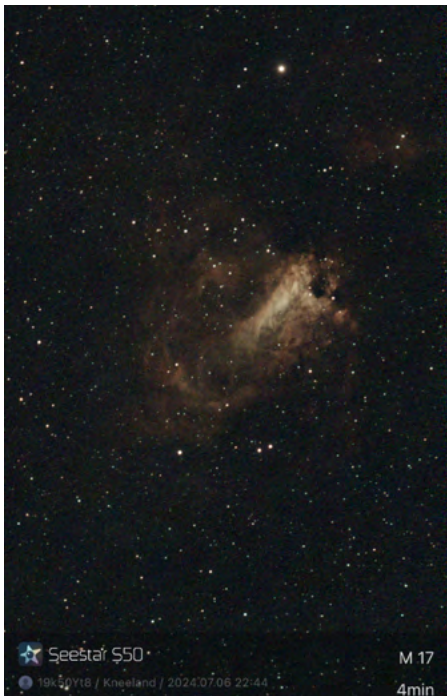
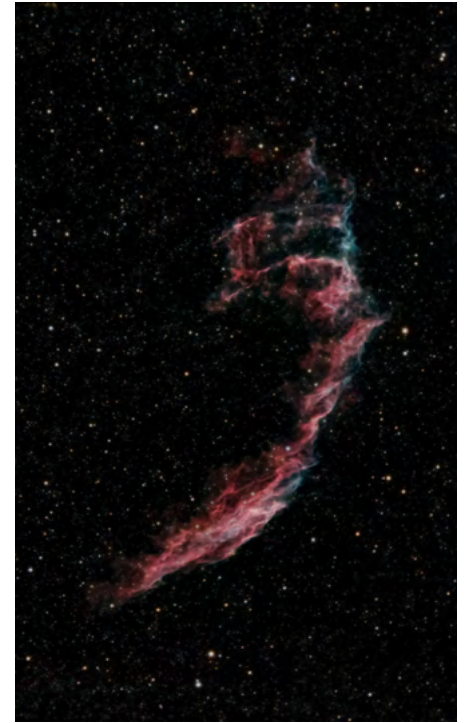
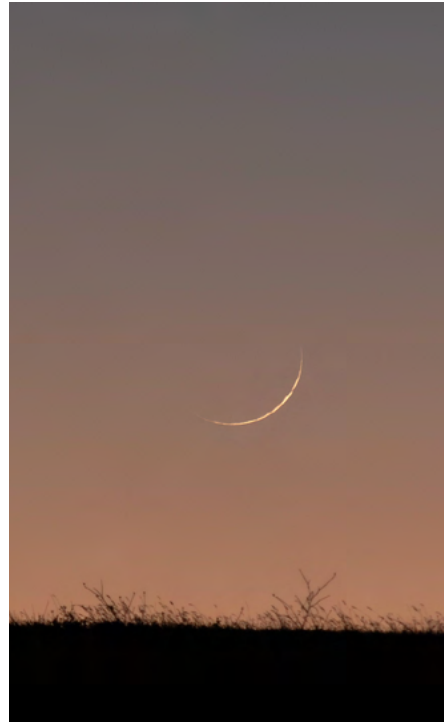
We had observing sessions at Kneeland Airport on July 6 and August 31.



Photos from July 6: Top left: Some of the usual suspects, getting set up. Bottom left: There's always some kind of wildlife hanging around. Top right: More setting-uppers. These three photos by Catrina Howatt.

Bottom right: Johann finding something almost overhead. Photo by Allison Waltberg.





More photos from July 6.
These were taken by Grace Wheeler with her Seestar Smart Telescope:
The Owl Cluster (in this view it looks like an owl standing on its head); The Lagoon, M8; The Swan, aka The Omega Nebula, M17.
Opposite, from Rob Wohleb, with an Apertura 60mm FPL-53 Doublet APO Refractor, paired with an ASI 533MC Pro Camera:
The 30-hour-old Moon, setting; The Eastern Veil Nebbula; Comet 13p Olbers.





Below: Saturn and the moons Titan, Rhea, and Dione, imaged by Grace Wheeler with a ZWO ASI178mc planetary camera. The image was created by stacking 2250 frames in Autostakkert and sharpening the final image in Registax.



On August 31 we had our annual observatory cleanup party (above). We then went to the Airport for observing: Left, Russ getting aligned; below, getting ready for some binocular viewing; above right, Don putting the pieces together. Photos by Ken Yanosko.



Perseids

Observers going out to look at the Perseid meteors (and to photograph them) were surprised to see a reprise of last Spring's auroral activity. Several observers from dark areas reported seeing unusual sky-glow along with the meteors.

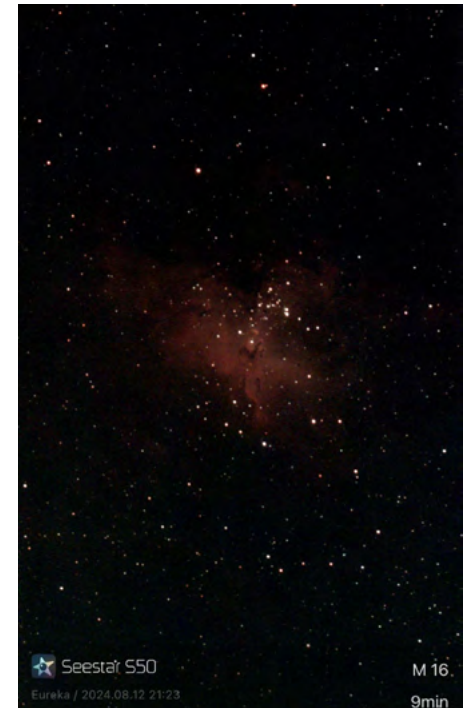
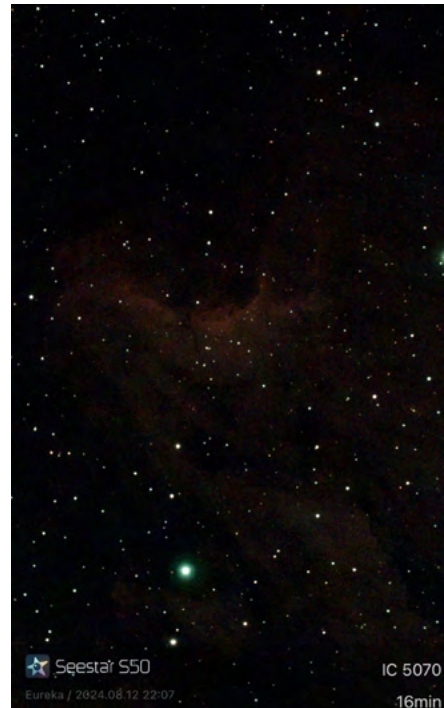


Above: Perseids and aurora from Horse Mountain. Photo by Jack Hopkins.

Seestar in Eureka

Brent and Catrina borrowed Grace's Seestar and used it from their backyard right in Eureka to get some astrophotos.

At right: The Moon; The Dumbbell Nebula, M27; The Pelican Nebula; The Eagle Nebula, M16. Photos by Brent and Catrina Howatt with a Seestar Smart Telescope, in Eureka on August 12.



The Ghost of Cassiopeia (from Grace Wheeler)

IC 63, also known as the Ghost of Cassiopeia, is named for its faint and ghostly appearance. It is both an emission and reflection nebula in the constellation Cassiopeia. Nearby IC 59 (to the left of IC 63) is also an emission and reflection nebula, and these two nebulae are often photographed together. (Someone on the Cloudy Nights forum referred to them as the "Ghost of Cassiopeia" because they both looked ghostly.)

IC 63 and IC 59 are clouds of molecular hydrogen and dust about 670 light years from the blue subgiant star Gamma Cassiopeiae, which is informally known as Navi. Navi is the middle star in the asterism of five stars that form the "W" in Cassiopeia. The UV radiation from Navi is sculpting both IC 63 and IC 59 by erosion. The UV bombardment also excites the molecular hydrogen which emits H-alpha radiation as red light; this accounts for the reddish hue seen in these nebulae. Starlight from Navi is reflected as blue light from the gas and dust of IC 63 and IC 59. This bluish glow, which is characteristic of reflection nebulae, shows up strongly in IC 59 and is patchy in IC 63. Presumably the purple hue seen throughout the nebulae is a mix of the red and blue light being emitted. To find out more about IC 63 and IC 59, go here: <https://esa-hubble.org/news/heic1818/> and <https://sci.esa.int/web/hubble/-/60876-ground-based-view-of-the-sky-around-ic-63>.

IC 63 and IC 59 are faint objects (magnitude 10) and are difficult to see through the telescope. The brightness of nearby Navi also washes out the view of these objects. The Ghost of Cassiopeia has long been on my bucket list of deep-sky images. As an homage to autumn and the upcoming Halloween festivities, I chose to

image it. Little did I know how tricky it would be to image and process these nebulae. It is one of the faintest objects that I have ever worked on and I spent several hours using Photoshop tricks to bring out the signal from IC 63 and IC 59. At the same time, I had to tame the background and contend with the bright halo from Navi. While I still have much to learn, it is somewhat of a treat to put out something that is presentable. Happy Halloween!



IC 63, Ghost of Cassiopeia (in the center) and IC 59 (left) imaged over three nights for a total of 10.5 hours. IC63 and IC 59 were imaged with a 71mm refractor, narrowband nebula filters, and a Canon EOS Ra. Total integration time was 10 hours. The light, dark, and flat frames were stacked in Affinity Photo. Processing was done with Photoshop.

International Observe the Moon Night

The Astronomers of Humboldt sponsored one of 2,087 events in the United States, and 5,960 worldwide, in support of International Observe the Moon Night in 2024. The event was scheduled for September 14, but since it was mostly overcast here on the coast, and even up the hill at Kneeland, it was fortunate that we had planned a "virtual" event. People were asked to observe on their own—or even observe a livestream of the Moon—and report in. Here are a few of the photos received:

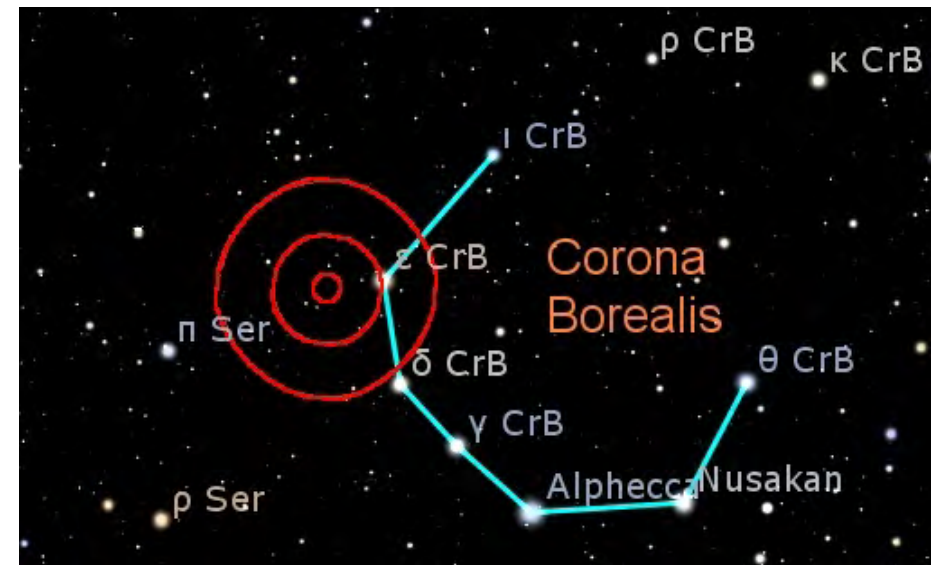


Nova T Coronae Borealis

The cataclysmic variable star T Coronae Borealis, normally a 10th-magnitude telescopic object, is predicted to undergo one of its quasi-periodic once-in-80-years outbursts which will brighten it to magnitude 2 or so. Nicknamed the "Blaze Star," this is a binary star system where one of the components collects stellar material being shed by its companion and then, when the accumulation gets large enough, blasts it away in a thermonuclear explosion. These explosions occur repeatedly, unlike in a supernova explosion, where the star gets blasted out of existence. See the details at NASA: <https://www.nasa.gov/centers-and-facilities/marshall/nasa-global-astronomers-await-rare-nova-explosion/>.

Astronomers have been watching for this explosion all summer. As you might guess, these things aren't exactly predictable, like eclipses and conjunctions and transits. But we can hope the event will occur before Corona Borealis disappears behind the Sun later in the Fall.

Keep this finder chart handy, keep watching the news, and keep looking up.



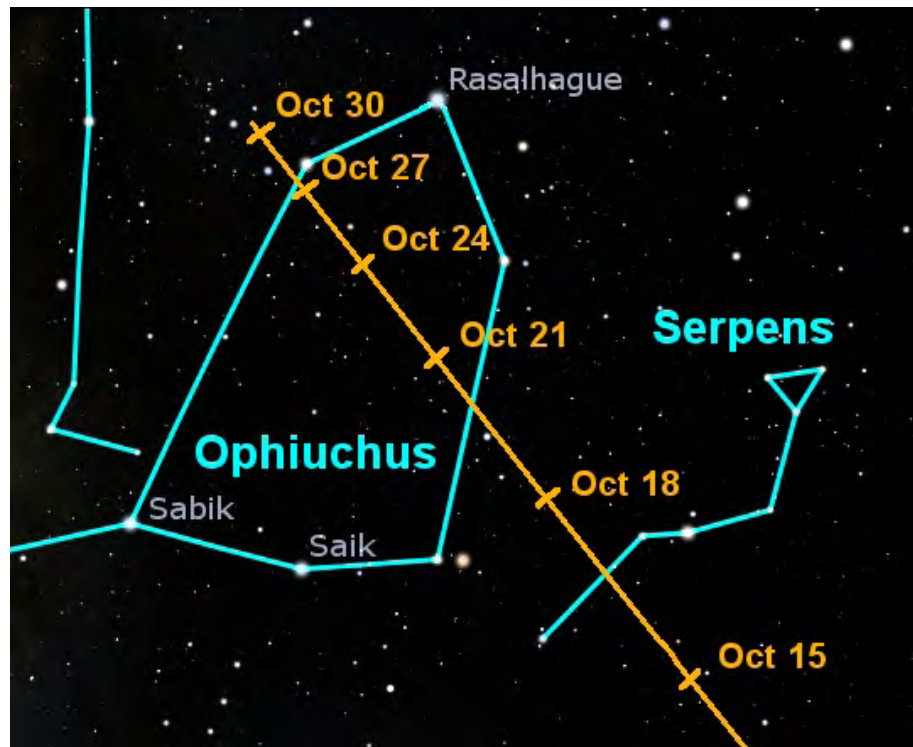
Finder chart for the cataclysmic variable star T Coronae Borealis, which is expected to go nova any day now. The Telrad circles are 0.5, 2, and 4 degrees in angular diameter. From [Stellarium](#).

Comet Tsuchinshan–ATLAS

Another comet has appeared and is currently in the southern hemisphere sky where we can't see it. And it is rapidly getting too close to the Sun to be observable at all. But in late October it is expected to be well-placed for Northern Hemisphere observers to be able to see it in the early evening sky. And, since it will be at its closest to Earth at that time, optimists are predicting naked-eye visibility. (Of course, there are various degrees of optimism—I've even read "Comet of the Century" for this one.)

As you can tell from its hyphenated name, Comet C/2023 A3 was discovered independently at the Tsuchinshan ("Purple Mountain") Observatory near Nanjing, China and by the Asteroid Terrestrial-impact Last Alert System (ATLAS) a system of four telescopes looking for near-Earth objects.

Let's hope for a good show!



Finder chart for Comet Tsuchinshan-ATLAS for late October. From [Stellarium](#).

Planetary Parade

Unlike novae and comets, the planets are well-behaved. This fall the outer planets will line up nicely for our inspection. They appear one-by-one in the east throughout the afternoons and evenings. Here's a table of planetrise times at the beginning of each of the next three months.

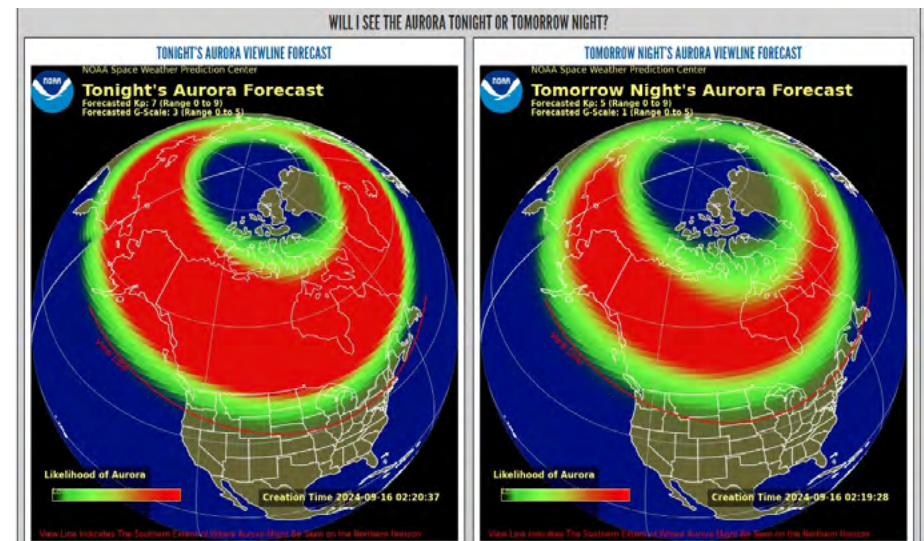
	Oct 1	Nov 1	Dec 1*
Saturn	6:01 pm	3:55 pm	12:56 pm
Neptune	6:25 pm	4:23 pm	1:24 pm
Uranus	8:56 pm	6:50 pm	3:47 pm
Jupiter	10:26 pm	8:20 pm	5:07 pm
Mars	12:07 am **	11:52 pm	10:44 pm

* Pacific Standard Time

** Next morning

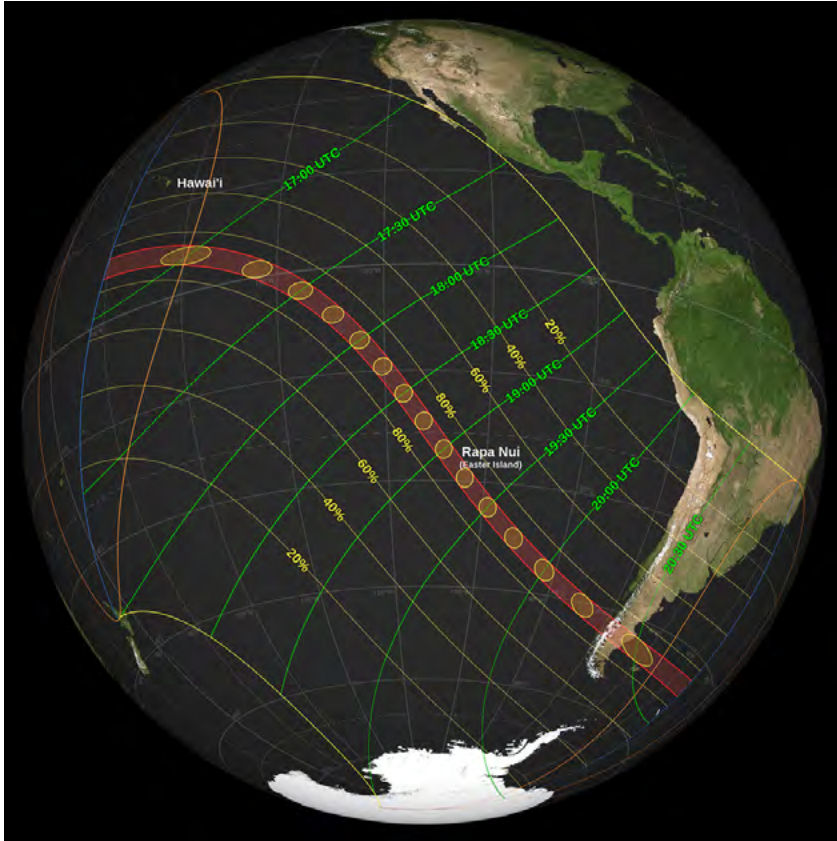
More Auroras?

Two words: "Who knows?" But check out NASA's experimental Aurora Forecast Pages at <https://www.swpc.noaa.gov/communities/aurora-dashboard-experimental>.



Annular Eclipse

On October 2 the Earth is treated to another annular eclipse. The partial phase hits the eastern half of the South Pacific Ocean and the southern half of South America, with the path of annularity hitting land only in Patagonia, the southern region of Chile and Argentina.



Map from [NASA](#)

Meteor Showers

- Southern Taurids: November 4-5
- Northern Taurids: November 11-12
- Leonids: November 17-18
- Geminids: December 13-14

Upcoming AOH Events

- October 18: Science Night at College of the Redwoods:

We will have a number of walk-in indoor activities and demonstrations set up for adults and kids. In addition, if the sky is clear we will set up one or more scopes for some viewing. If you are interested in helping out, please contact Brent at brent@astrohum.org.

- Tentative: Kneeland School Fall Festival:
We will do some show-and-tell activities for kids and parents. And if the weather is clear we will open the observatory. If you are interested in helping out, please contact Brent at brent@astrohum.org.
- November 16: Annual General Membership Meeting:
Location and detailed agenda for our general membership meeting will be distributed by email. Officers will present their reports to the membership. Candidates for the Board of Directors will be presented. If there is no change to the slate of nominees, the Bylaws permit us to vote at the meeting.

Miscellaneous News

- Donation from The Humboldt Redwoods Interpretive Association:
Our Treasurer Catrina has reported that the HRIA donated \$450 to AOH in thanks for our star parties this past Summer. Thanks to the AOH members who participated, to the HRIA volunteers who supported us, and especially to Mary Kaufman, who is at the intersection of the two organizations and who was responsible for organizing the events.
- Speaking of HRSP:
The website Mental Floss has studied data generated by state park-goers all across the country and has determined that Humboldt Redwoods State Park was the "NATION'S FAVORITE." See their report at <https://www.mentalfloss.com/posts/best-state-parks-us>. We like to think that our star parties at the park over the past few years might have contributed to this ranking.

And Thanks

—for help with the Newsletter—to Catrina, Rob, Allison, Grace, Jack, Yoon, Susie, and Susan.

—Ken

The Autumn Constellations

by Allison Waltberg

With summer drawing to a close, the birds of the Summer Triangle—Cygnus and Aquila—are migrating west for winter and making way for the fall constellations. Looking south along the ecliptic, we first find the boomerang-shaped outline of Capricornus the sea-goat (or as I prefer to call him, the goat mermaid). Behind him is Aquarius the water-bearer, currently pouring Saturn out from his jug along with a stream of stars reaching down toward Fomalhaut, the mouth of the Southern Fish, Piscis Austrinus.

On Aquarius's other side is a totally separate fish constellation, Pisces, identifiable by its "circler" and long V shape which represent two fish tied together by a rope. Below Pisces is Cetus, the whale/shark/sea monster—we'll come back to him in a minute! Squeezed along the eastern side of Pisces, we find Aries—which is supposed to be a ram, though I confess it just looks like a curved line to me. Above Aries is Triangulum, which as you might imagine represents... a triangle. Yeah, the ancients got real creative coming up with that one. (Maybe they were on a tight deadline.)

Moving up above Pisces, though, puts you square in the middle of a scene from a mythological action movie...

The backstory goes: in the ancient kingdom of Aethiopia lived King Cepheus and Queen Cassiopeia. Cassiopeia was very vain, and bragged that she was more beautiful than all of the Nereids, the divine nymphs of the sea. Enraged by this claim, Poseidon, the mighty god of the sea, sent a sea monster (remember Cetus?) to destroy their kingdom. Cepheus visited an oracle and learned that Poseidon must be appeased by sacrificing their daughter, the princess Andromeda, to the beast. Andromeda was summarily chained to a rock by the shore and left for Cetus, while the king and queen watched from atop the cliffs.

Meanwhile, on an obscure Greek island, the great hero Perseus was on a totally unrelated quest to slay the monstrous Gorgon Medusa, a woman with snakes for hair whose terrifying gaze turned anyone who looked at her to stone. Perseus used his shield as a mirror to behold Medusa, and from her neck sprang the winged horse Pegasus. Perseus took Medusa's head as a trophy, threw it in a sack, hopped on the back

of Pegasus, and flew off for home. But above the coast of Aethiopia, Perseus spotted a beautiful woman chained to a cliff by the ocean. Just as he flew down for a closer look, Cetus emerged from the ocean to devour Andromeda! Perseus sliced through Andromeda's chains and pulled her atop Pegasus, then took Medusa's head from its sack and petrified the whale, which sank into the sea. While the king and queen looked on in shock from their thrones, the hero and the princess rode their magical horse off into the sunset, and probably lived happily ever after.

The night sky depicts the whole fantastic scene: King Cepheus (shaped like a five-year-old's drawing of a house) and Queen Cassiopeia (the "W", representing her throne), high above the scene; Pegasus (a very obvious square shape, with legs and head toward the west) soaring through the sky, with Andromeda clinging to his back (she's shaped like half of a banana, which I like to think of as her long hair being swept behind her in the wind), and Perseus (the legs of a stick figure, holding Medusa's head) defending her from Cetus (kind of a snake shape) below. You could even imagine Triangulum as Perseus's sword, which is way cooler than just giving up after "triangle".

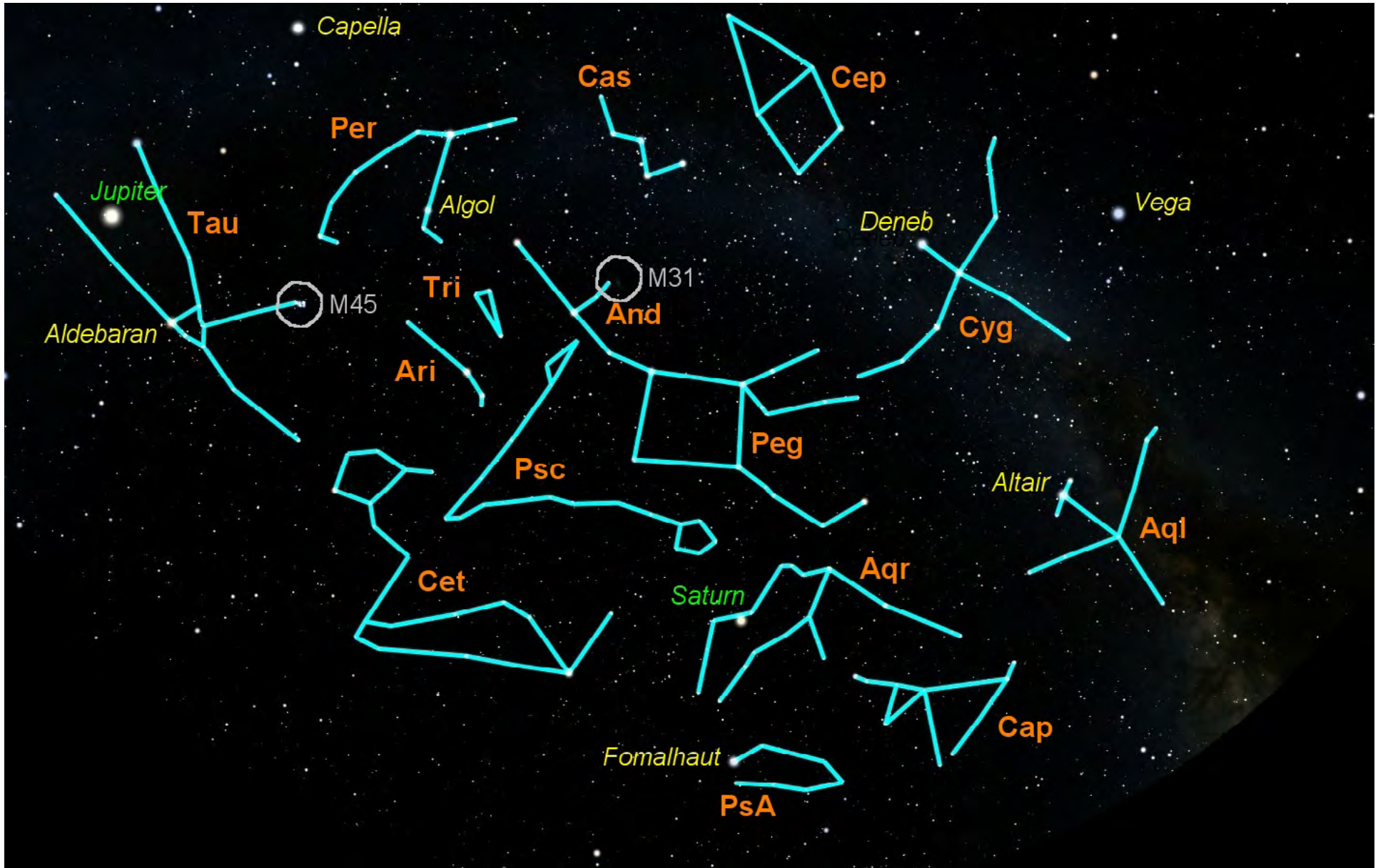
This story is really well-fit to the star patterns; Medusa's head is even represented by the star Algol, an eclipsing binary star system which experiences a regular pattern of dimming and brightening every few days as the dimmer star passes in front of the brighter one. This earns it the name from the Arabic "ra's al-ghul"—which any Batman fans might recognize as meaning "head of the demon"—and hence its nickname "the Demon Star". And the Andromeda Galaxy (M31) can be seen faintly glowing near the heart of Andromeda, with the right half of Cassiopeia's W pointing right at it.

Later in the evenings and later in the season, we'll start to see the Pleiades open cluster (M45) leading the way for Taurus the bull. Taurus's triangular face is formed by the brightest stars in the Hyades star cluster, along with one glaring red eye, Aldebaran - though at the moment it's playing second fiddle to Jupiter shining between the bull's horns. The Pleiades and the Hyades form the "Golden Gate of the Ecliptic", representing two gateposts on either side of the ecliptic line, which the Sun, Moon, and planets regularly pass through as they appear to move across the sky.

With Jupiter and Saturn both shining brightly in the sky this

autumn, it's an excellent opportunity to pull out the telescope and give your neighbors' kids a peek. Saturn's rings are narrowing as we approach the plane-crossing in 2025, and has just passed opposition so it's visible

the entire night. With Saturn's narrowing rings and Jupiter's four Galilean moons, you've got some easy and exciting targets to get people hooked on astronomy!



The sky, looking south from Humboldt County, at 10 pm on November 1, 2024. From [Stellarium](https://www.stellarium.org/).

Saturn in 2024 and 2025

by Grace Wheeler

Saturn's Rings are "Disappearing!"

Currently, Saturn's rings are nearly edge-on with an inclination of about 3 degrees as seen from Earth's perspective. In March 2025, the inclination of the rings will go to zero and the rings will seemingly disappear. Because of the thinness of the rings, less light is reflected and for a brief period, Saturn will appear to be ringless. From Earth's viewpoint, this phenomenon of "disappearing" rings occurs every 15 years and marks the transition of how the rings are tilted towards the Earth. The last time Saturn's rings were edge-on to the Earth was 15 years ago (2009) and this marked the beginning of the northern face (top) of the rings being tilted towards Earth. Starting in May 2025, the rings will be tilted with the southern (bottom) face towards the Earth. This southern view of the face will last until the rings return to zero inclination sometime in 2040. To read more about the cyclic nature of how we view the tilt of Saturn's rings from Earth, go to <https://earthsky.org/space/saturns-rings-are-disappearing-march-2025/>.

We won't be able to observe the "ringless" Saturn in March 2025 because Saturn will be too close to the sun as it enters solar conjunction and disappears behind the Sun. The next time that the inclination of the rings will be close to zero will be in late November 2025 when the inclination will be around 0.4 degrees <https://www.aaq.org.au/saturn-in-2024-2025-and-the-next-edge-on-appearance-of-its-rings/>.

This will be observable from Eureka since Saturn will be in the evening sky and setting after midnight.

Observing the Moons of Saturn

As Saturn's rings become seemingly thinner, it is easier to see the moons as these are not occulted by the rings or washed out by the rings' brilliance. On the night of our star party, we observed Titan, Rhea, and Dione through the telescope. As the inclination of the rings becomes smaller, it should be possible to see the moons Enceladus, Tethys, and Mimas; these moons orbit close to Saturn and are usually washed out by the brightness of the rings. More on Saturn's moons can be found here:

https://web.pa.msu.edu/people/horvatin/Astronomy_Facts/planet_pages/Saturns_moons.htm.

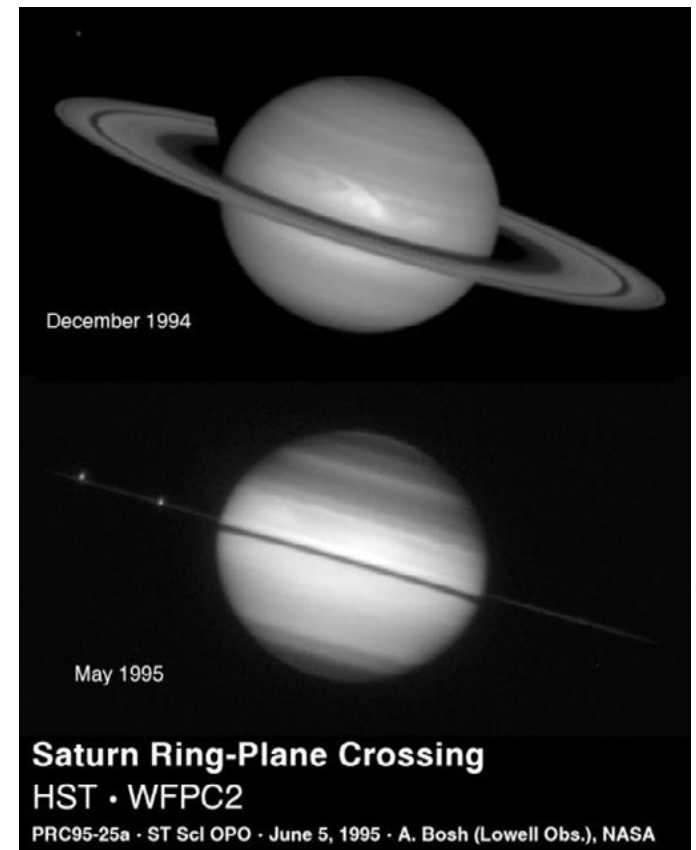
Titan Moon and Shadow Transits

In 2025, Saturn's rings will be relatively thin and positioned equatorially. This situation makes it possible to observe transits of Saturn's moons and their shadows across the disc. Transits of Titan should be easiest to see because of the moon's large size: Titan is the largest moon of Saturn and the second largest in the solar system. There will be at least three Titan moon and shadow transits in the fall of 2025: September 3, September 19, and October 6. These transits should be well placed for viewing since Saturn will be close to opposition and out most of the evening. See <https://www.cloudynights.com/topic/927143-titan-shadow-transits-2024-5/>.

Ring-plane crossing 30 years ago as seen by the Hubble Space Telescope. The bottom picture shows moons Tethys and Dione.

Top photo: Reta Beebe (New Mexico State University), D. Gilmore L. Bergeron (ST ScI) and NASA.

Bottom photo: Amanda S. Bosh (Lowell Observatory), Andrew S. Rivkin (Univ. of Arizona/LPL), the HST High Speed Photometer Instrument Team (R.C. Bless, PI), and NASA. <https://hubblesite.org/contents/media/images/1995/25/304-Image.html>.



Book Review: A City on Mars

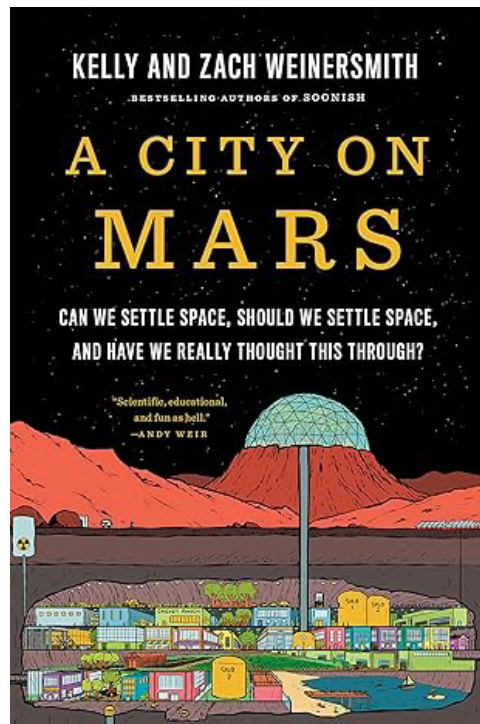
by Ken Yanosko

From the book jacket:

"Earth is not well. The promise of starting life anew somewhere far, far away—no climate change, no war, no Twitter—beckons, and settling the stars finally seems within our grasp. Or is it? Critically acclaimed, bestselling authors Kelly and Zach Weinersmith set out to write the essential guide to a glorious future of space settlements, but after years of research, they aren't so sure it's a good idea. Space technologies and space business are progressing fast, but we lack the knowledge needed to have space kids, build space farms, and create space nations in a way that doesn't spark conflict back home. In a world hurtling toward human expansion into space, *A City on Mars* investigates whether the dream of new worlds won't create nightmares, both for settlers and the people they leave behind. In the process, the Weinersmiths answer every question about space you've ever wondered about, and many you've never considered:

"Can you make babies in space? Should corporations govern space settlements? What about space war? Are we headed for a housing crisis on the Moon's Peaks of Eternal Light—and what happens if you're left in the Craters of Eternal Darkness? Why do astronauts love taco sauce? Speaking of meals, what's the legal status of space cannibalism?"

"With deep expertise, a winning sense of humor, and art from the beloved creator of



Saturday Morning Breakfast Cereal, the Weinersmiths investigate perhaps the biggest questions humanity will ever ask itself—whether and how to become multiplanetary.

"Get in, we're going to Mars."

In their introduction, the authors explain:

"We are space geeks. We love rocket launches and zero gravity antics. . . .

"After a few years of researching space settlements, we began in secret to refer to ourselves as the 'space bastards' because we found we were more pessimistic than almost everyone in the space-settlement field, and especially skeptical about the most grand plans of space geeks. We weren't always this way. The data made us do it. Frankly, we are cowards and would very much like to agree with the consensus. We didn't like being this pessimistic, especially about an endeavor that so many people think embodies the best of human nature. It makes one feel like, well, a bastard. We think space settlement is possible, but the discourse needs more realism—not in order to ruin everyone's fun, but to provide guardrails against genuinely dangerous directions for planet Earth."

Yes, this book is about space exploration and space colonization, but it is not a pie-in-the-sky "we can solve all of our problems and save humanity" book. The authors consider not only the engineering and biological difficulties ahead of us, but also the economic and social and political ramifications of trying to establish colonies on the Moon and on Mars. There is a lot more to think about than providing air, water, food, and building materials. We have to be able to protect ourselves from radiation, from extreme heat and cold, from toxic soil, and also from the personal and corporate and nationalistic failures that often lead to uncontrolled exploitation and warfare.

The conclusion? According to the authors: "We don't know how to do it yet, but we still believe that someday, with enough knowledge, we can have Mars. And one very faraway day, other solar systems. But we have to earn it, both by gaining in knowledge and by becoming a more responsible, more peaceful species. Going to the stars will not make us wise. We have to become wise if we want to go to the stars."

This article is distributed by the [NASA Night Sky Network](#), a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach.



September's Night Sky Notes: Marvelous Moons

by Kat Troche

September brings the gas giants Jupiter and Saturn back into view, along with their satellites. And while we organize celebrations to observe our own Moon this month, be sure to grab a telescope or binoculars to see other moons within our Solar System! We recommend observing these moons (and planets!) when they are at their highest in the night sky, to get the best possible unobstructed views.

The More the Merrier

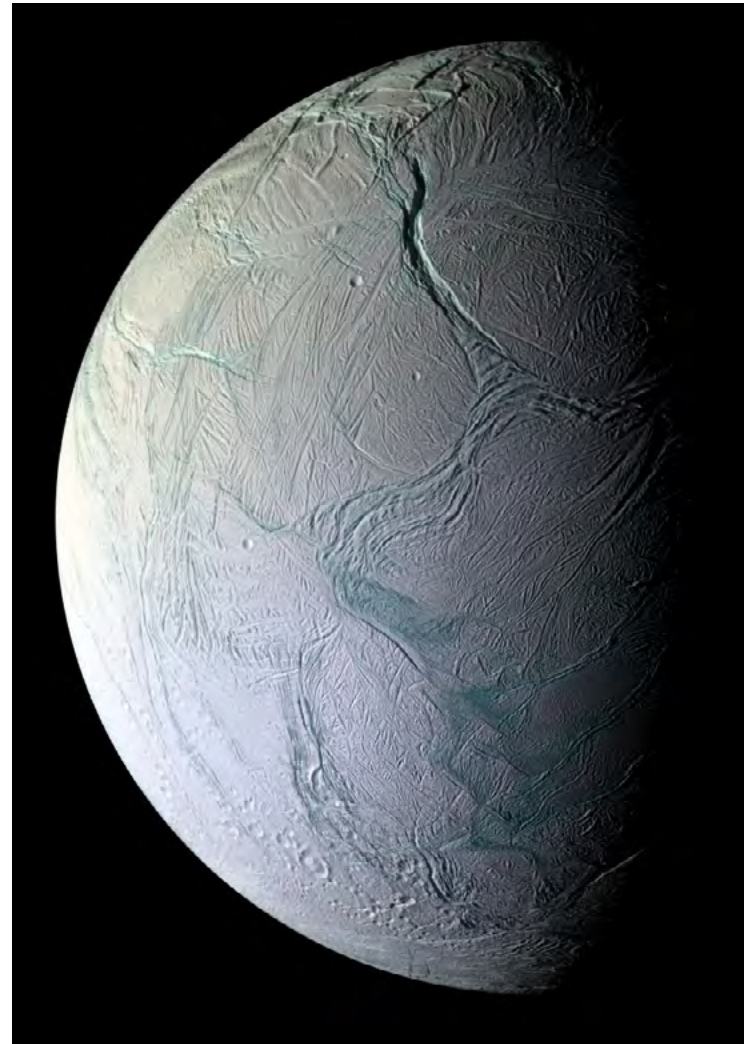
As of September 2024, the ringed planet Saturn has 146 identified



The Saturnian system along with various moons around the planet Saturn: Iapetus, Titan, Enceladus, Rhea, Tethys, and Dione. Credit: Stellarium Web.

moons in its orbit. These celestial bodies range in size; the smallest being a few hundred feet across, to Titan, the second largest moon in our solar system.

Even at nearly 900 million miles away, Titan can be easily spotted next to Saturn with a 4-inch telescope, under urban and suburban skies,



This mosaic of Saturn's moon Enceladus was created with images captured by NASA's Cassini spacecraft on Oct. 9, 2008, after the spacecraft came within about 16 miles (25 kilometers) of the surface of Enceladus. Credit: NASA/JPL/Space Science Institute.

due to its sheer size. With an atmosphere of mostly nitrogen with traces of hydrogen and methane, Titan was briefly explored in 2005 with the Huygens probe as part of the Cassini-Huygens mission, providing more information about the surface of Titan. NASA's mission Dragonfly is set to explore the surface of Titan in the 2030s.

Saturn's moon Enceladus was also explored by the Cassini mission, revealing plumes of ice that erupt from below the surface, adding to the brilliance of Saturn's rings. Much like our own Moon, Enceladus remains tidally locked with Saturn, presenting the same side towards its host planet at all times.

The Galilean Gang

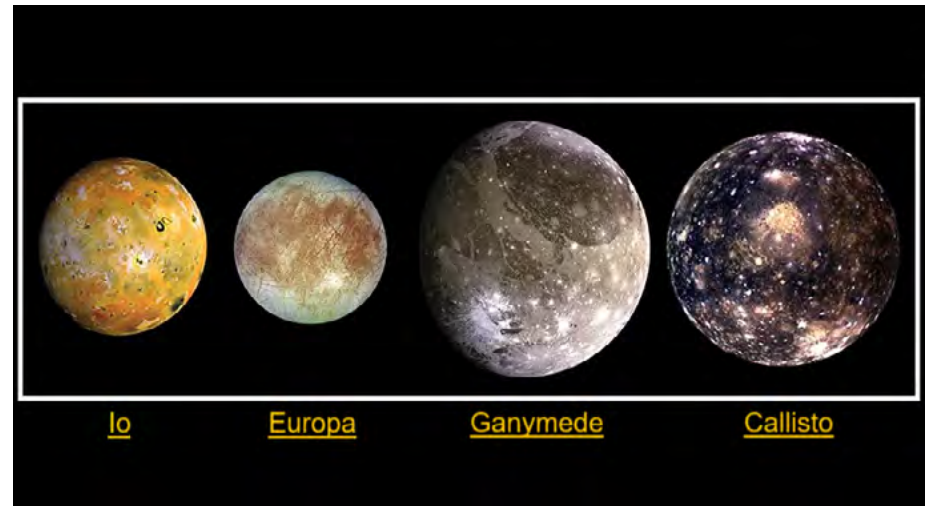
The King of the Planets might not have the most moons, but four of Jupiter's 95 moons are definitely the easiest to see with a small pair of binoculars or a small telescope because they form a clear line. The Galilean Moons – Ganymede, Callisto, Io, and Europa – were first discovered in 1610 and they continue to amaze stargazers across the globe.

- Ganymede: largest moon in our solar system, and larger than the planet Mercury, Ganymede has its own magnetic field and a possible saltwater ocean beneath the surface.



The Jovian system: Europa, Io, Ganymede, and Callisto. Credit: Stellarium Web.

- Callisto: this heavily cratered moon is the third largest in our solar system. Although Callisto is the furthest away of the Galilean moons, it only takes 17 days to complete an orbit around Jupiter.
- Io: the closest moon and third largest in this system, Io is an extremely active world, due to the push and pull of Jupiter's gravity. The volcanic activity of this rocky world is so intense that it can be seen from some of the largest telescopes here on Earth.
- Europa: Jupiter's smallest moon also happens to be the strongest candidate for a liquid ocean beneath the surface. NASA's Europa Clipper is set to launch October 2024 and will determine if this moon has conditions suitable to support life. Want to learn more? Rewatch the July 2023 Night Sky Network webinar about Europa Clipper at <https://www.youtube.com/live/RnnLJBLRBCA>.



Kat Troche is a project coordinator and informal educator for the Astronomical Society of the Pacific and an administrator for NASA Night Sky Network, supporting over 400 astronomy clubs nationwide. Duties include:

Hosting 'Office Hours' for astronomy clubs

Content production and distribution of monthly updates and articles

Social media management

Scheduling and hosting monthly webinars

After Words

"The night is even more richly colored than the day. . . . If only one pays attention to it, one sees that certain stars are citron yellow, while others have a pink glow or a green, blue and forget-me-not brilliance. And without my expiating on this theme, it should be clear that putting little white dots on a blue-black surface is not enough."

—Vincent van Gogh, Painter

* * *

"When I consider how, after sunset, the stars come out gradually in troops from behind the hills and woods, I confess that I could not have contrived a more curious and inspiring sight."

—Henry Thoreau, Poet

* * *

"The real friends of the space voyager are the stars. Their friendly, familiar patterns are constant companions, unchanging, out there."

—James Lovell, Astronaut

* * *

"It is reasonable to hope that in the not too distant future we shall be competent to understand so simple a thing as a star."

—Arthur Eddington, Astrophysicist

* * *

"Though my soul may set in darkness, it will rise in perfect light; I have loved the stars too fondly to be fearful of the night."

—Sarah Williams, Poet

Heavenly Bodies

by Susie Christian



HEAVENLY BODIES

What Cats See in the Night Sky