



The Newsletter for Keene Amateur Astronomers

Vol. 2025 No. 5

May 2025

Hubble Captures NGC 1961 Spiral Galaxy



This NASA/ESA Hubble Space Telescope image features a peculiar spiral galaxy called Arp 184 or NGC 1961. The galaxy, called Arp 184 or NGC 1961, sits about 190 million light-years away from Earth in the constellation Camelopardalis (The Giraffe). Image Credit: ESA/Hubble & NASA, J. Dalcanton, R. J. Foley (UC Santa Cruz), C. Kilpatrick

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Editor's Message

May offers several exciting opportunities for stargazers and astronomy enthusiasts. One of the month's highlights is the Eta Aquarid meteor shower, which peaks around May 5–6. This shower, caused by debris from Halley's Comet. Many of the meteors leave striking dust trails that can linger for several seconds. The shower typically produces 10 - 20 meteors per hour, and with the waxing crescent Moon, moonlight interference should be minimal, making for ideal conditions.

Planet watchers also have plenty to enjoy this month. Mars and Jupiter are visible in the western sky shortly after sunset. If you plan to observe Jupiter, plan to do so early, as it sets before 10 pm. In the pre-dawn sky, Venus and Saturn will appear together at the start of the month and gradually drift apart as the month progresses. Later in the month, the waning Moon will pass near both Saturn and Venus over the course of several days, creating ever changing early morning conjunctions.

For those with telescopes or binoculars, be sure to catch Mars passing through the Beehive Cluster early in the month—a beautiful pairing that won't return for another two years. Both should be visible together in a standard 10x50 binocular field of view. Other excellent targets this month include the Sombrero Galaxy (M104), the globular cluster Messier 3, and Messier 64, also known as the Black Eye Galaxy.

I hope you enjoy this month's NSN article on how we detect exoplanets, along with our feature article on K2-18b, a fascinating world that has recently captured headlines for its potential signs of life.

I encourage you to subscribe to my [blog](#) as I prepare for and embark on the journey of a lifetime to Chile, where I'll be visiting some of the world's largest telescopes as part of the [ACEAP program](#). It promises to be an incredible experience, and I look forward to sharing it with you.

- Susan Rolke

Monthly Business Meeting

Our next meeting will take place on May 16th at 7:00 at the Observatory.

Work Session at the Observatory has been rescheduled for May 17th.

Astronomy Conventions, Retreats, and More

[Live Deep Sky Tour: Galaxies](#), hosted by McDonald Observatory May 28th at 10:15 ET

[DarkSky International's Photo Contest - Capture the Dark](#), submit your entry by June 30th. There are multiple categories.

Stellafane, July 24 - 27 hosted by the Springfield Telescope Makers. For more details click [here](#). Note - registration will open around May 1st.

Signs of Life or False Alarm? Decoding K2-18b's Chemical Clues

By Susan Rolke

First discovered in 2015 by NASA's K2 mission, K2-18b has captured global attention this past month after researchers announced they had detected the strongest evidence yet of possible life on another planet. The question remains: have we truly found the first exoplanet that harbors life, or is this a false alarm? Regardless of the outcome, the findings promise to advance our understanding of exoplanetary atmospheres and could mark a significant step toward answering one of humanity's oldest questions—are we alone in the universe?

The detection of life beyond Earth would be among the most profound scientific discoveries in history. Within the Milky Way galaxy alone, there are hundreds of millions of potentially habitable planets. As astronomer Carl Sagan said, "Extraordinary claims require extraordinary evidence," a reminder that remarkable discoveries demand equally rigorous evidence.

Researchers studying K2-18b have identified it as part of a newly proposed class of potentially habitable planets known as "Hycean" worlds—a term combining "hydrogen" and "ocean." These planets are thought to be covered in vast oceans and enveloped by hydrogen-rich atmospheres. Some astronomers consider Hycean worlds to be promising candidates in the search for extraterrestrial life.

Typically, Hycean planets are larger than Earth but smaller than Neptune, placing them in the "sub-Neptune" category. Currently, sub-Neptunes are the most commonly detected type of exoplanet. However, this prevalence may not reflect the actual distribution of planet sizes in the galaxy, but rather a detection bias based on the methods we use to find exoplanets.



Photo Credit: NASA, CSA, ESA, J. Olmstead (STScI), N. Madhusudhan (Cambridge University)

Most of the exoplanets discovered to date have been identified using a method known as the Transit Method. This method involves detecting a slight dip in a star's brightness when a planet passes in front of it, blocking a portion of the starlight. By measuring this dip, astronomers can determine key characteristics of the planet, such as its orbital period, distance from the star, size, and more.

More recently, thanks to the capabilities of the James Webb Space Telescope, researchers can now analyze a planet's atmosphere as it transits its host star. When starlight passes through the planet's atmosphere, it carries information about the gases present. Astronomers use spectroscopy to study these light signatures and identify the chemical compounds in the atmosphere, helping to build a clearer picture of the atmospheric composition of distant worlds.

K2-18b is located 124 light years away in the constellation Leo. It is 8.6 times more massive than the Earth and 2.6 times larger. The planet lies within the habitable zone of its parent star and therefore has the possibility of liquid water on its surface. In 2023, K2-18b made headlines as the first exoplanet in a habitable zone that had carbon based molecules present in the atmosphere. The [results](#), which were published in *The Astrophysical Journal Letters* in September 2023, presented evidence for the detection of carbon dioxide, methane, and a weaker signal that could be caused by dimethyl sulfide.

Nikku Madhusudhan of the University of Cambridge and his colleagues published a [recent study](#) on K2-18b in *The Astrophysical Journal Letters* on April 17. Using data from the James Webb Space Telescope (JWST), the team constructed the planet's spectrum using two independent methods, both of which yielded consistent results. They then compared the observed spectrum against signatures of 20 different molecules to identify

possible matches. Two candidates emerged: dimethyl sulfide (DMS) and dimethyl disulfide (DMDS). However, the current data is not sufficient to determine which molecule is actually present.

Astronomers often search for certain molecules as potential biosignatures—chemical indicators that may suggest the presence of life. On Earth, dimethyl sulfide is primarily produced by biological processes, especially by ocean-dwelling organisms like bacteria and plankton. That said, DMS and similar compounds can also form through non-biological means, so their detection alone is not definitive proof of life.

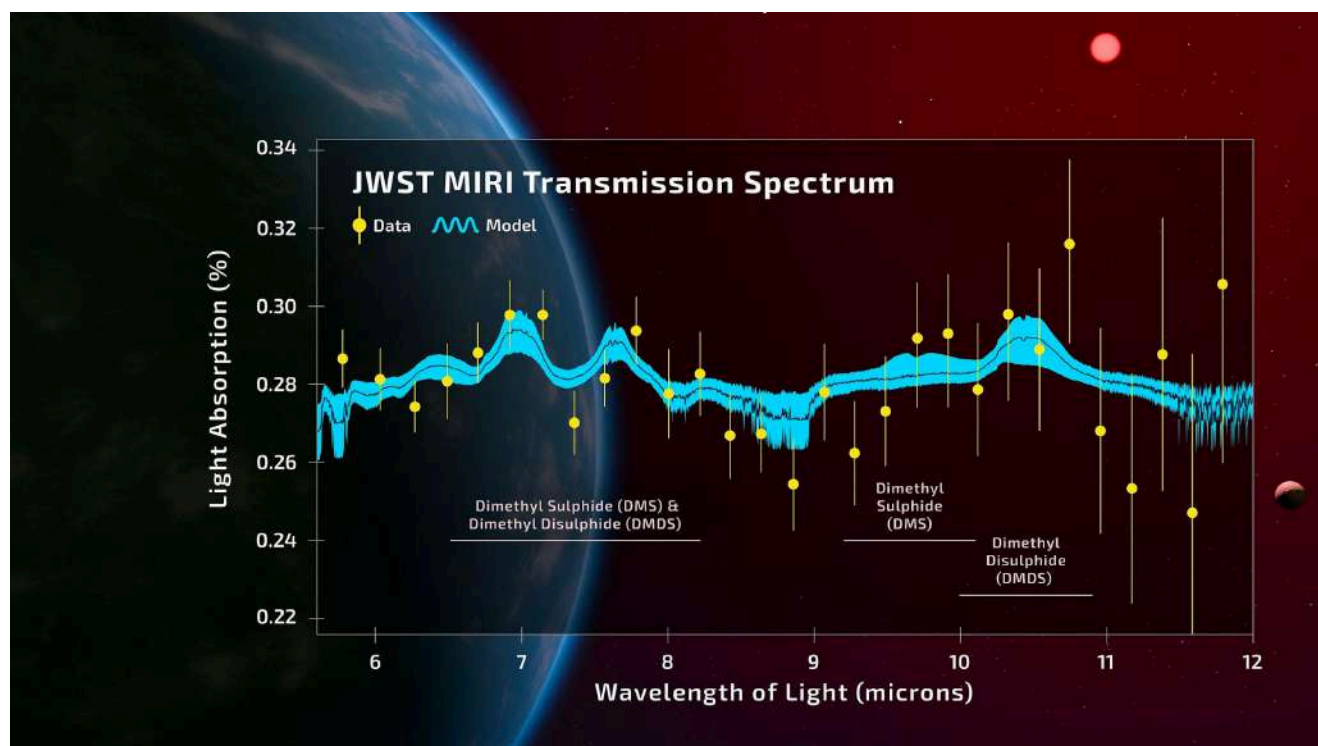


Photo Credit: A. Smith, N. Madhusudhan (University of Cambridge)

The amount of dimethyl sulfide on Earth is very different from the amount detected on K2-18b'. On Earth it is generally below one part per billion by volume. On K2-18b, they are estimated to be thousands of times stronger – over ten parts per million. Due to the lack of sub-Neptune sized planets in our own solar system means our understanding of their atmosphere is based on scientific modeling. Some models support the presence of high concentrations of dimethyl sulfide on a Hycean ocean world teeming with life.

The concentration of dimethyl sulfide (DMS) on K2-18b appears to be vastly different from that on Earth. While Earth's atmosphere typically contains less than one part per billion by volume, estimates for K2-18b suggest levels over ten parts per million—thousands of times higher. Because our solar system lacks sub-Neptune-sized planets, our understanding of their atmospheres is in its early stages and much is not known.

Whether we have truly found evidence of life beyond Earth remains a subject of active debate. Many researchers remain skeptical of the findings. Some question whether K2-18b is too close to its host star to sustain a liquid ocean, while others challenge the accuracy of carbon dioxide measurements reported in the earlier study. Additional doubts have been raised about the absence of ethane—a gas that should be present as a

byproduct of the breakdown of dimethyl sulfide and dimethyl disulfide, if those molecules are indeed in the atmosphere. Critics also argue that the detection of these molecules may have resulted from a biased analytical approach.

Yet, such scrutiny is fundamental to the scientific process. In science, no claim is ever truly "proven"; instead, each is tested repeatedly through challenge and replication. As bold claims are made, they are met with equally rigorous efforts to disprove them. This skepticism is not obstruction—it is essential, especially when the stakes involve the discovery of life beyond our planet.

So why are many astronomers still unconvinced? To be considered a credible biosignature, a signal from an exoplanet must meet three critical criteria:

1. Is the planet what we think it is?
2. Is the signal real?
3. Is life the only possible explanation for that signal?

At this time, none of these questions can be answered with certainty.

Madhusudhan, the lead author of the recent paper, emphasizes that while the results are exciting, it is essential to gather more data before making any claims about the discovery of life on another world. He is, however, cautiously optimistic. Meanwhile, other research teams are working to replicate the group's findings. While others will search for additional biosignatures in K2-18b's atmosphere, since the detection of a single molecule is not enough to confirm the presence of life.

Findings should be approached with skepticism until they are confirmed by multiple teams using different methods. As Carl Sagan famously said, "Life is a hypothesis of last resort. You invoke it only when there's no other way to explain what you see."

As researchers continue to search for life beyond Earth, the techniques and insights developed to study K2-18b will be invaluable for future investigations of other potentially habitable worlds. Every new dataset in astrobiology contributes to our broader understanding of how life might exist elsewhere—and how it first arose here on Earth.

Future studies of K2-18b will be fascinating to follow, as each new observation brings us closer to broadening our understanding of sub-Neptune worlds. Whether or not the planet ultimately harbors life, continued exploration will refine our techniques, improve our models, and expand our knowledge of exoplanetary atmospheres. As technology advances and more powerful instruments come online, we'll be better equipped to interpret distant signals with greater precision and accuracy. The study of K2-18b is a crucial step in a much larger journey—one that may eventually answer one of humanity's most profound questions: Are we alone in the universe?

For more information:

[Hycean Worlds](#) at Cambridge University's Institute of Astronomy

[Video](#), Professor Nikku Madhusudhan explains recent observations with JWST

Night Sky Network Online Webinar

Join NASA [Night Sky Network](#) on Thursday, May 15, at 9:00 PM Eastern Dr. Eric E. Mamajek where he will be “Placing Worlds and Suns in Context” as he discuss the path to exo-Earths with NASA’s Habitable Worlds Observatory.

A description of this webinar will be posted on the NSN youtube channel soon.

Dr. Eric E. Mamajek is a principal scientist at the NASA Jet Propulsion Laboratory in Pasadena, CA, and since 2016 he has served as the Deputy Program Chief Scientist for the NASA Exoplanet Exploration Program, managed by JPL for the Astrophysics Division of the NASA Science Mission Directorate. Eric is currently co-chair of the Habitable Worlds Observatory Science Working Group on Target Stars & Systems. Eric is also active in the International Astronomical Union, having founded the IAU Working Group on Star Names in 2016, and co-chairing the 2019 and 2022 IAU NameExoWorlds exoplanet public naming campaigns.

NASA Night Sky Notes, May 2025



This article is distributed by NASA's Night Sky Network (NSN).

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

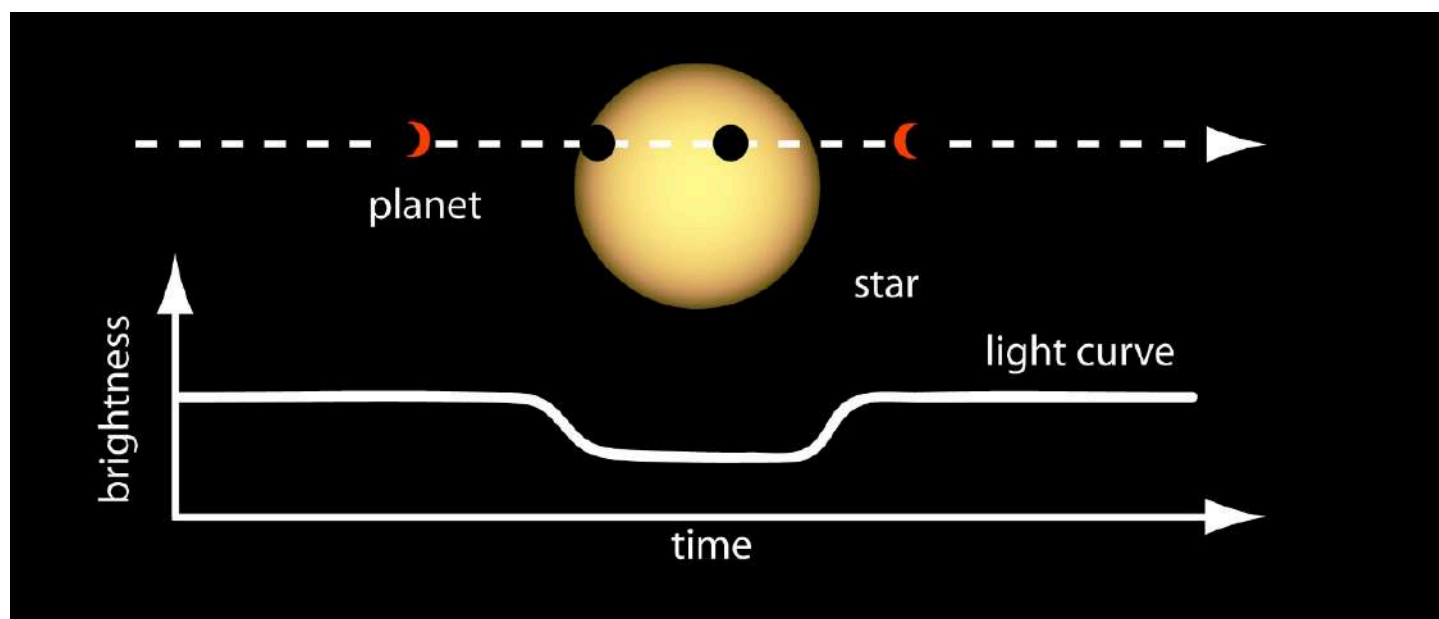
May's Night Sky Notes: How do we Find Exoplanets?

By Dave Prosper

Updated by: Kat Troche

Astronomers have been trying to discover evidence that worlds exist around stars other than our Sun since the 19th century. By the mid-1990s, technology finally caught up with the desire for discovery and led to the first discovery of a planet orbiting another sun-like star, [Pegasi 51b](#). Why did it take so long to discover these distant worlds, and what techniques do astronomers use to find them?

The Transit Method

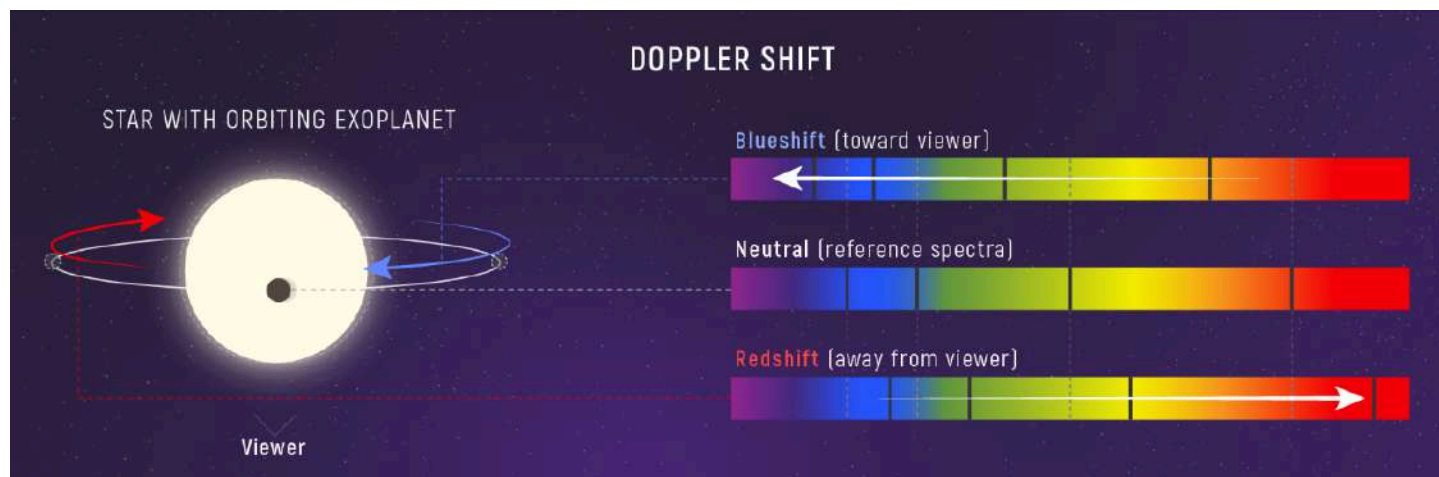


A planet passing in front of its parent star creates a drop in the star's apparent brightness, called a transit. Exoplanet Watch participants can look for transits in data from ground-based telescopes, helping scientists refine measurements of the length of a planet's orbit around its star. Credit: NASA's Ames Research Center

One of the most famous exoplanet detection methods is the **transit method**, used by [Kepler](#) and other observatories. When a planet crosses in front of its host star, the light from the star dips slightly in brightness. Scientists can confirm a planet orbits its host star by repeatedly detecting these incredibly tiny dips in brightness using sensitive instruments. If you can imagine trying to detect the dip in light from a massive searchlight when an ant crosses in front of it, at a distance of tens of miles away, you can begin to see how difficult it can be to spot a planet from light-years away! Another drawback to the transit method is that the distant solar system

must be at a favorable angle to our point of view here on Earth – if the distant system's angle is just slightly askew, there will be no transits. Even in our solar system, a transit is very rare. For example, there were two transits of Venus visible across our Sun from Earth in this century. But the next time Venus transits the Sun as seen from Earth will be in the year 2117 – more than a century from now, even though Venus will have completed nearly 150 orbits around the Sun by then!

The Wobble Method



As a planet orbits a star, the star wobbles. This causes a change in the appearance of the star's spectrum called Doppler shift. Because the change in wavelength is directly related to relative speed, astronomers can use Doppler shift to calculate exactly how fast an object is moving toward or away from us. Astronomers can also track the Doppler shift of a star over time to estimate the mass of the planet orbiting it. Credit: NASA, ESA, CSA, Leah Hustak (STScI)

Spotting the Doppler shift of a star's spectra was used to find Pegasi 51b, the first planet detected around a Sun-like star. This technique is called the **radial velocity or "wobble" method**. Astronomers split up the visible light emitted by a star into a rainbow. These spectra, and gaps between the normally smooth bands of light, help determine the elements that make up the star. However, if there is a planet orbiting the star, it causes the star to wobble ever so slightly back and forth. This will, in turn, cause the lines within the spectra to shift ever so slightly towards the blue and red ends of the spectrum as the star wobbles slightly away and towards us. This is caused by the [blue and red shifts](#) of the planet's light. By carefully measuring the amount of shift in the star's spectra, astronomers can determine the size of the object pulling on the host star and if the companion is indeed a planet. By tracking the variation in this periodic shift of the spectra, they can also determine the time it takes the planet to orbit its parent star.

Direct Imaging

Finally, exoplanets can be revealed by **directly imaging** them, such as this image of four planets found orbiting the star HR 8799! Space telescopes use instruments called **coronagraphs** to block the bright light from the host star and capture the dim light from planets. The Hubble Space Telescope has [captured images of giant planets orbiting a few nearby systems](#), and the James Webb Space Telescope [has only improved on these observations](#) by uncovering more details, such as the colors and spectra of exoplanet atmospheres, temperatures, detecting potential exomoons, and even scanning atmospheres for potential biosignatures!

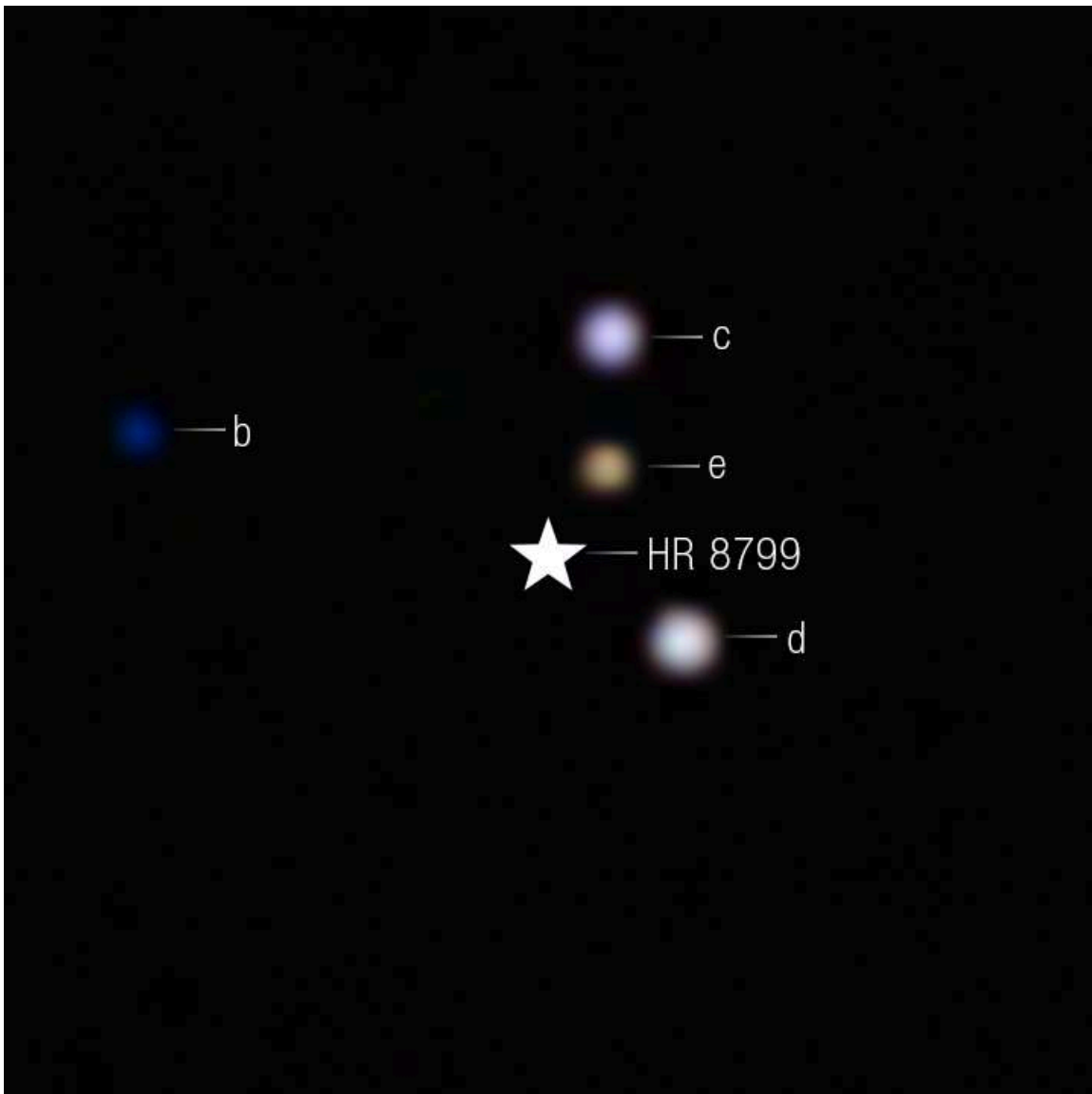


Image taken by the James Webb Space Telescope of four exoplanets orbiting HR 8799. Credit: NASA, ESA, CSA, STScI, Laurent Pueyo (STScI), William Balmer (JHU), Marshall Perrin (STScI)

You can find more information and activities on [NASA's Exoplanets](#) page, such as the [Eyes on Exoplanets](#) browser-based program, [The Exoplaneteers](#), and some of the [latest exoplanet news](#). Lastly, you can find more resources in our [News & Resources section](#), including a [clever demo](#) on how astronomers use the wobble method to detect planets!

The future of exoplanet discovery is only just beginning, promising rich rewards in humanity's understanding of our place in the Universe, where we are from, and if there is life elsewhere in our cosmos.

Observing

To find out skywatching tips for this month, click on the following links (in blue and underlined) to learn more.

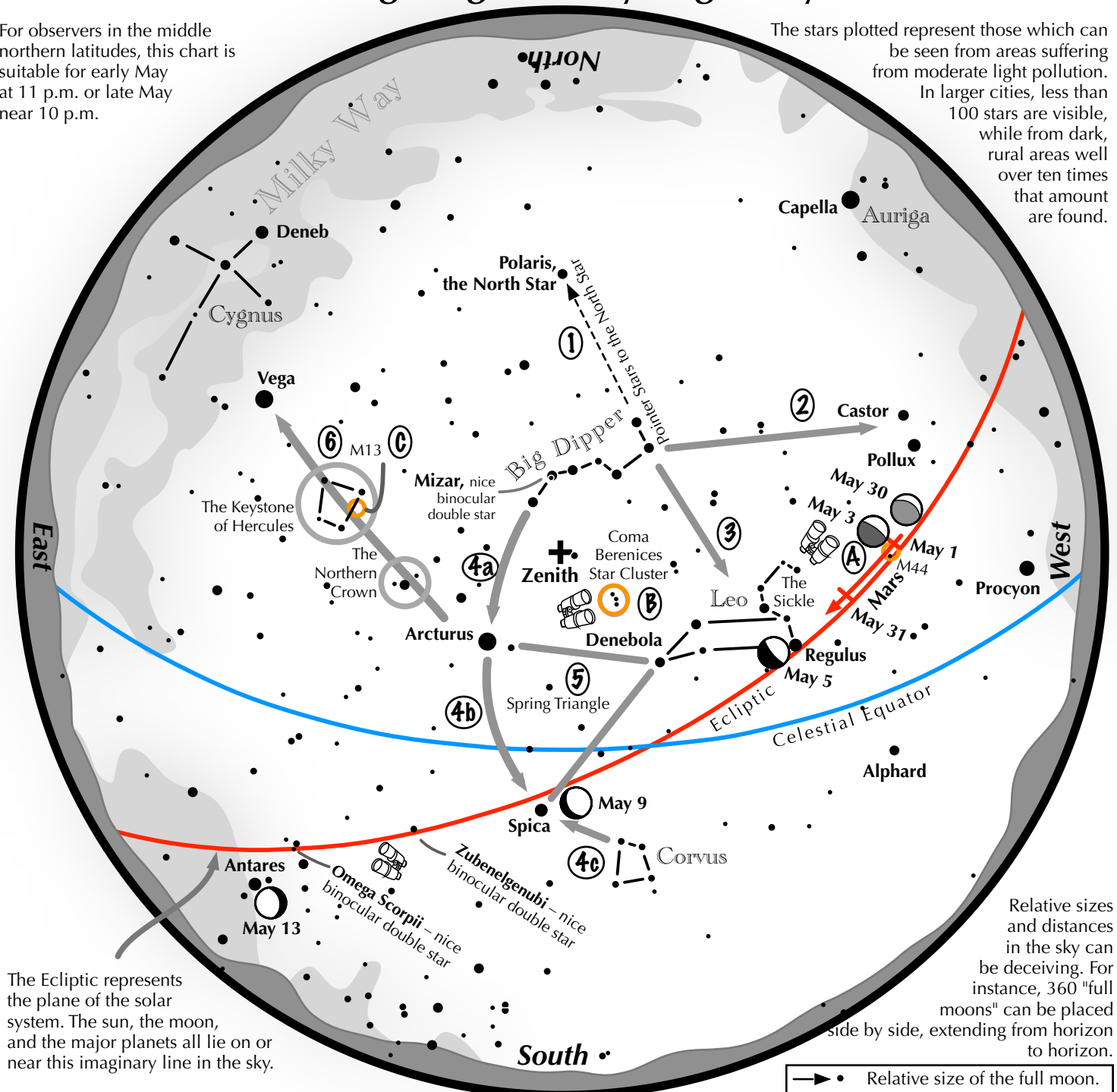
Video: [What's Up May 2025 Sky Watching Tips from NASA](#)

Full page charts for May are available on the following pages or you can access them at the Astronomical League's website [here](#).

Navigating the May Night Sky

For observers in the middle northern latitudes, this chart is suitable for early May at 11 p.m. or late May near 10 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

Navigating the May night sky: Simply start with what you know or with what you can easily find.

- 1 Extend a line northward from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
- 3 Directly below the Dipper's bowl reclines the constellation Leo with its primary star, Regulus.
- 4 Follow the arc of the Dipper's handle. It first intersects Arcturus, then continues to Spica.
Confirm Spica by noting that two moderately bright stars just to its southwest form a straight line with it.
- 5 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
- 6 Draw a line from Arcturus to Vega. One-third of the way sits "The Northern Crown." Two-thirds of the way hides the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.

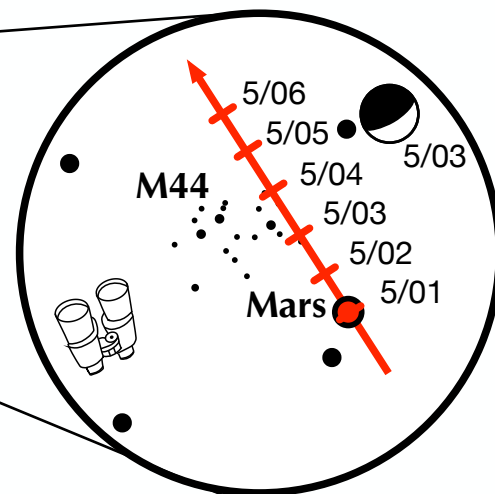
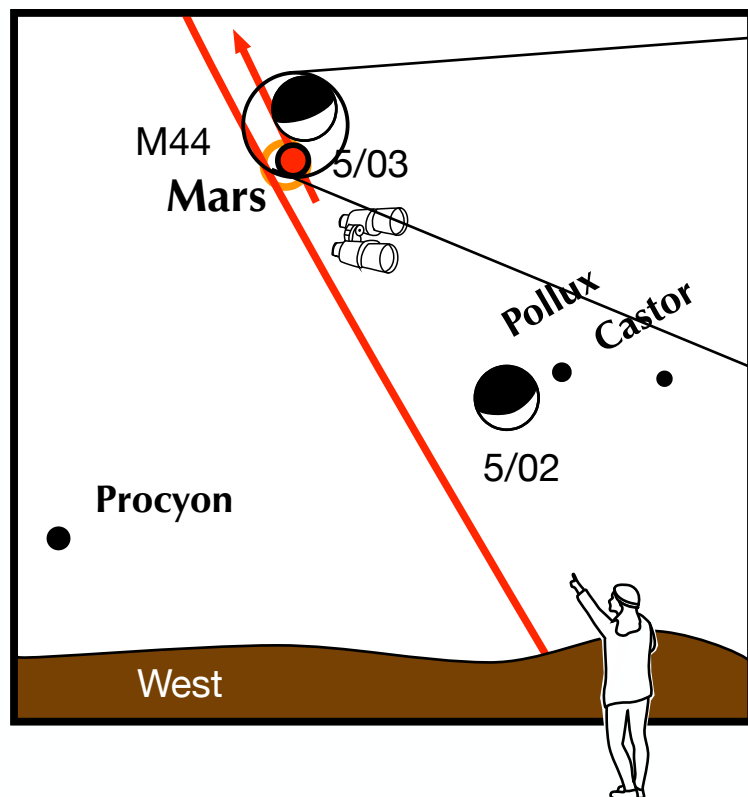
Binocular Highlights

A: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. **B:** Look near the zenith for the loose star cluster of Coma Berenices. **C:** M13, a round glow from a cluster of over 500,000 stars.





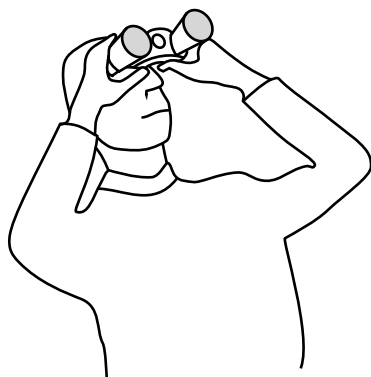
If you can see only one celestial event this month, see this one.



View through
10x50 binoculars

Beginning on May 1, look to the west-northwest 90 minutes after sunset.

- The twin stars of Gemini, Castor and Pollux, will be found forming a horizontal bar low above the horizon.
- On the following evening, the crescent moon moves near Pollux, almost forming a straight line with it and Castor.



- Red Mars slides toward M44, aka the Beehive Star cluster. Use binoculars to find Mars inching closer to the many stellar bees.
- On May 3, the thick crescent moon joins Mars sitting to the upper left of the red planet and above the bees.
- Over the next few evenings, the Red Planet moves past M44, leaving it on May 5.



Mare Orientale

... this most astounding impact basin is only partially seen

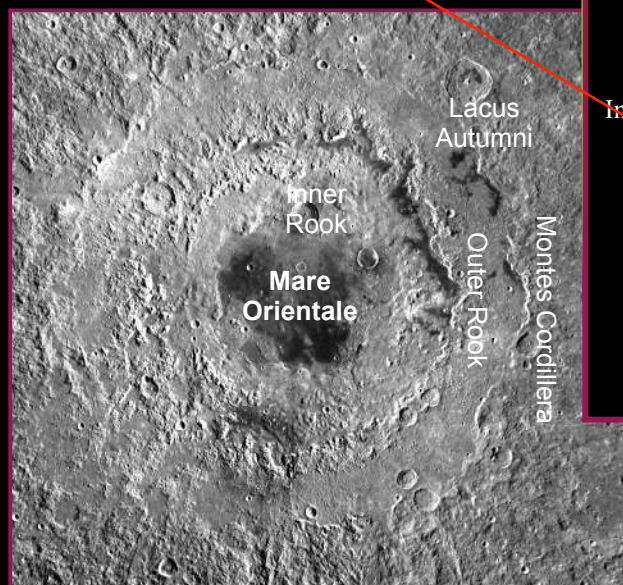
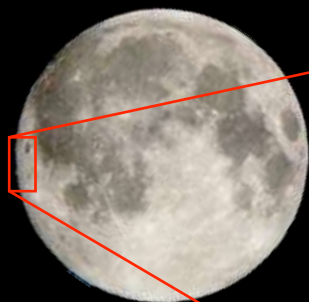
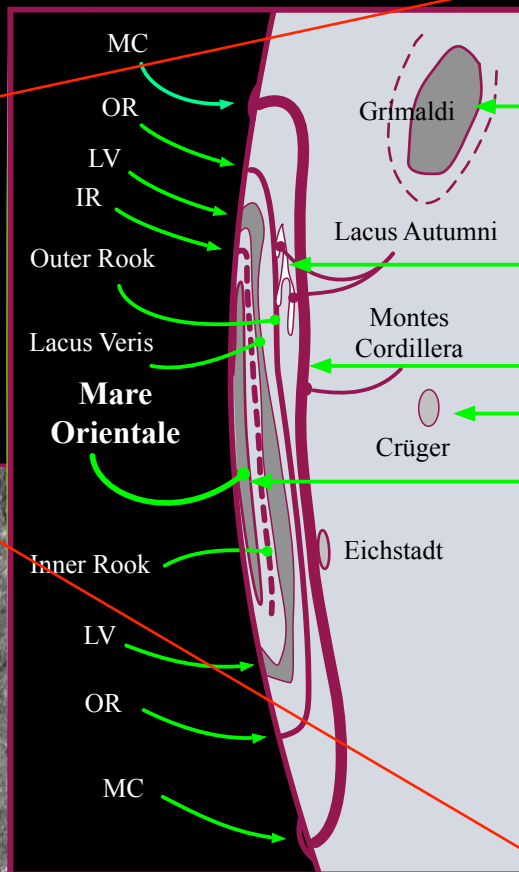


image: NASA/GSFC/ Arizona State University



Mare Orientale

Best seen in 2025
the mornings around May 18, June 18,
and July 16

A good viewing of Mare Orientale requires that the Moon be at or near maximum western libration. This happens on three, four, or five days in some, but not all months. Of course, it should not hide in the lunar night, which immediately eliminates fifteen days each month. The three mornings leading up to new Moon are also poor times because the waning thin crescent lies too close to the horizon to give a sharp enough image for a clear, meaningful view.

As a result, opportunities for studying Mare Orientale are infrequent, occurring on fewer than twenty days each year. Generally, four months running present three, four, or five good opportunities each, followed by a string of nine or ten months that present no suitable occasions for viewing it. And then there is the weather!

Identifying Orientale's fascinating features demands steady seeing and moderate magnification.