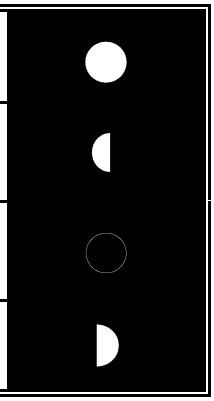
April Skies over the Pinnacles

April 2023
by Jeff Hutton

April's Four Principal Phases of the Moon

April 6	Full Moon	
April 13	Last Quarter	
April 20	New Moon	
April 27	First Quarter	

The "Dark Side" of the Moon

Apologies to the 70's iconic British rock band, Pink Floyd but there is no permanently dark side of the Moon. The whole sphere of the Moon experiences both day and night, just like the earth. One lunar day is about 29 Earth days long. There is an old astronomer's joke that I sometimes tell at star gazes which never fails to get a groan from the audience. Here it is

If you were to operate an illegal still in order to make an alcoholic drink, what would you call that drink?
Answer: *moonshine!*
If you were an astronaut on the Moon and you operated a still What would you call that alcoholic drink?
Answer: *earthshine!*

I recently enjoyed an article in the March 2023 issue of *Sky and Telescope* Magazine with the title of “Appreciating Earthshine”. The authors are Thomas Dobbins and William Sheehan.

Earthshine really is a thing! The next time the Moon is in the crescent phase, when the sunlit Moon looks like a fingernail, look closely. You can still see shape of the entire sphere of the Moon, including the part not lit by the Sun.

I took this picture of the Moon in 2011. The sunlit portion of the moon is deliberately over-exposed to contrast the nightime portion of the Moon against the evening sky. If you look closely you might be able to make out some lunar features on the night side. The craggy edge between light and dark is called the **terminator**. When you are admiring a pretty sunset or sunrise, you are standing on the earth’s **terminator**, or line between day and night.

So what is causing the feeble light on the Moon’s nightside that allows us to see it? We are! Rather, the Earth is. Sunlight that bounces off the Earth’s day side goes back out into space and some of it bounces off the moon and back to us.

Here’s a fun fact. When we are enjoying an evening right after dark and there is a waxing crescent Moon above, the **earthshine** we see is from sunlight bouncing off the Pacific Ocean. If you’re forced out of bed in the predawn hours, try to remember to look at the waning crescent Moon, if there is one. You might be startled at how bright the nightside Moon appears. That’s because the light bouncing of the Earth is from Eurasia and Africa. Land reflects more light than water. During the early spring of 2009 we received a lot of snow. During that same time, British observers noticed that the earthshine from the evening crescent moon was really bright. England’s evening earthshine is courtesy of North America.

The amount of light that reflects off a surface tells us its **albedo**. The scale for **albedo** runs from 0.0 to 1.0. Freshly fallen snow has an **albedo** of 0.9. Oceans have an **albedo** value of 0.06. The Moon’s albedo is 0.07. One of the things that concerned NASA before the Apollo lunar landings in the 1960's and 1970's was whether the astronauts could read their checklists outside their spacecraft during the lunar night. Earth-based studies estimated that the typical lunar night is about as bright as your back yard about 17 feet away from a 60-watt incandescent light bulb.

When the moon nears half-illuminated from our view (also known as the first quarter phase) too much light is reflected back to us from the day side of the moon to see the Moon's nightside. Here is some more fun with numbers:

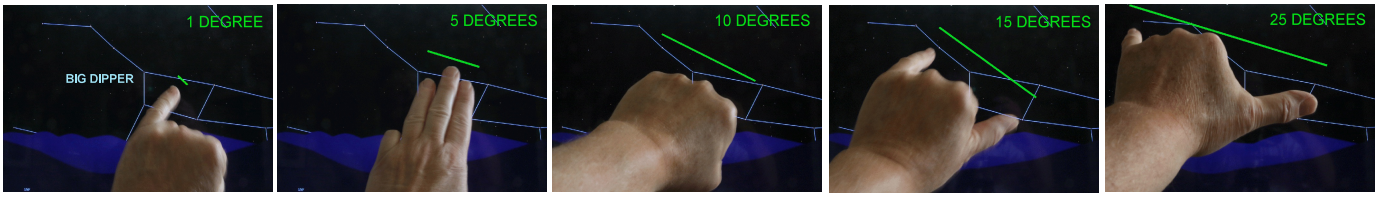
10,000	That's how many times brighter the sunlit side of the Moon is than the night side.
40	That's how many times brighter the full Earth appears to the Moon than the full Moon appears from the earth.
0.07	That's the **albedo** of the Moon, about the same as black construction paper.

So next time you happen to see a crescent moon in a clear sky, think about the fact that some of the illumination of the nightside moon is from Hawai'i!

Here are two images of our Moon. To the left is a picture taken by my friend, Steve Rismiller, of the new Moon in 2017, during the total eclipse of the Sun. To the right is a picture I took of the full Moon. If you look carefully at Steve's picture, you might just be able to make out some of the same lunar features that can be seen in the picture I took.

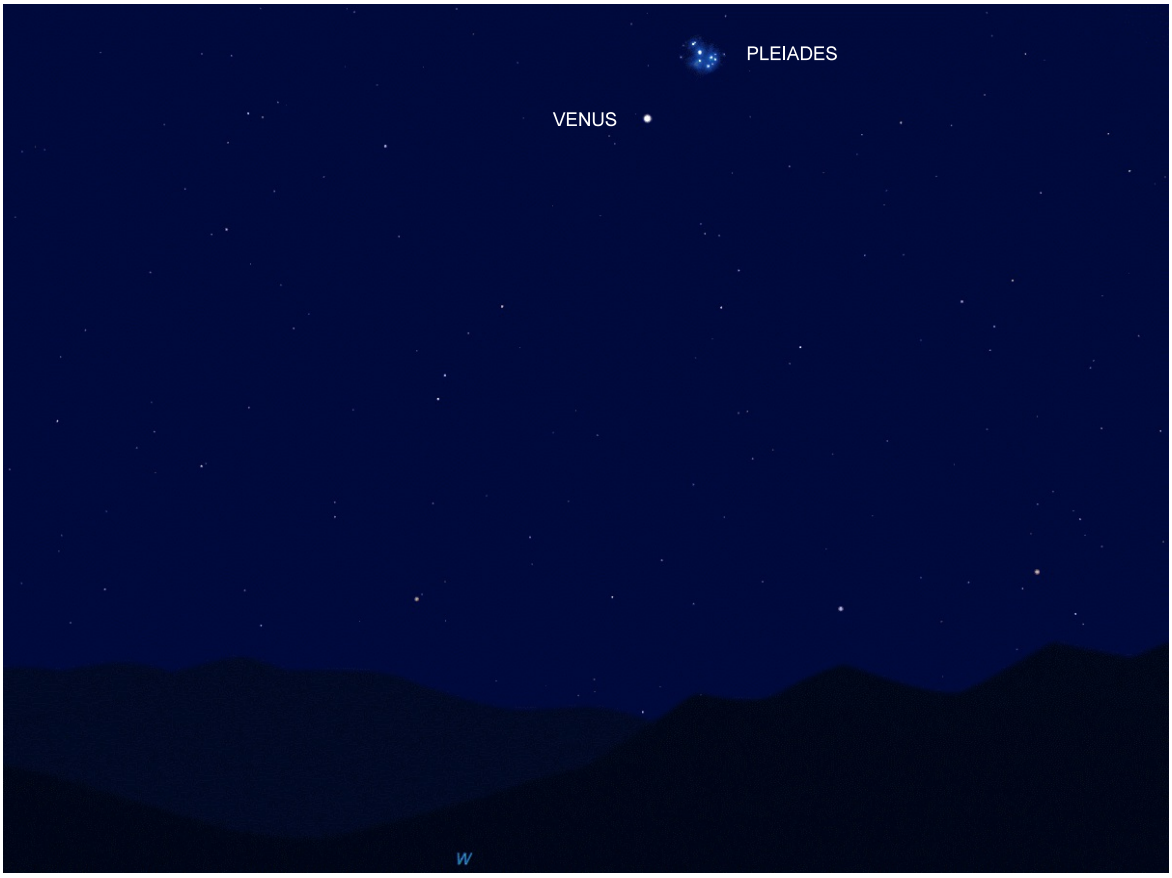
Attractions in April

Astronomers use a measuring scale of **angular distance** to show the apparent distance that separates two objects in the sky. A trip all the way around the sky would take 360 degrees. Here's a handy guide to estimate **angular distance** that you can use when you're out under the stars.

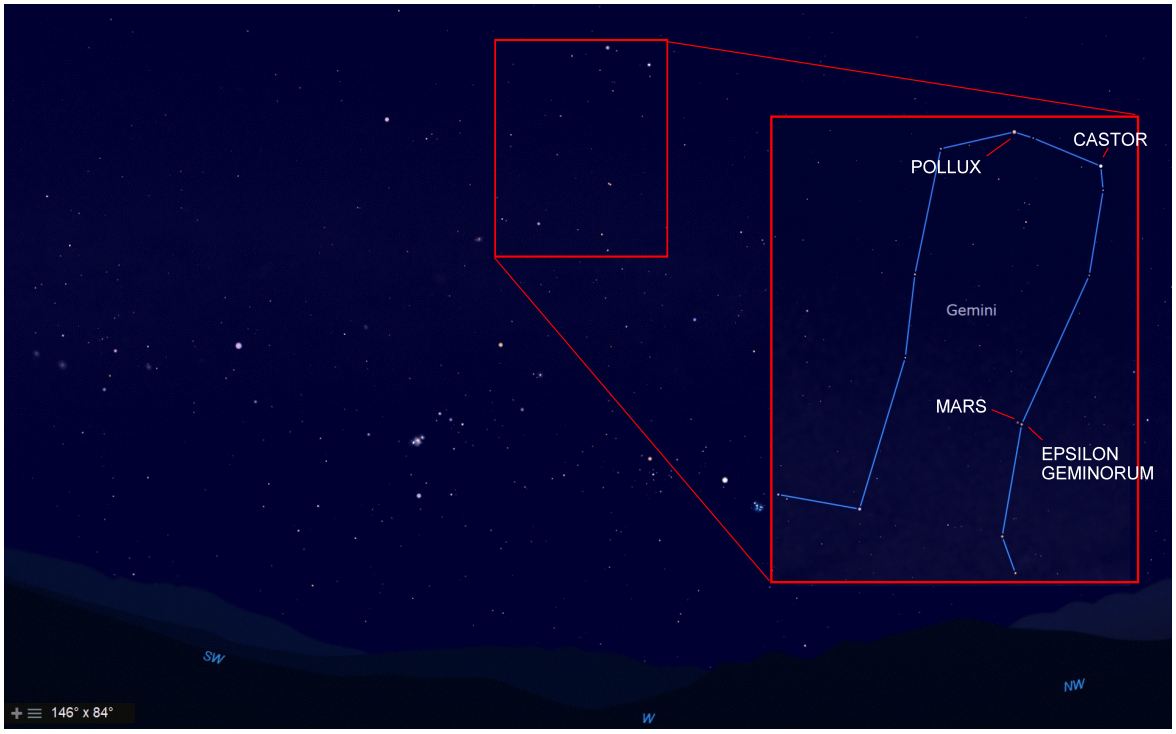


For instance, when you hold your hand all the way out and hold three fingers out, like the scout's salute in panel 2, your fingers create an **angular distance** of 5 degrees**,** about the width of the bowl of the Big Dipper. When I talk about the distance between, say, the Moon and a star or planet, I'll say that they are separated by a certain number of degrees. Sky and Telescope magazine is my source of most of the following information.

April 9 - 11 Go out just after dark and look to the high western sky and enjoy Venus as it glides along its orbit and appearing to slide past the beautiful star cluster known as the Pleiades. Don't be fooled by how close they appear to be. Venus is right next door at about 40 million miles away and the Pleiades are 440 light years away. (One light years is about 6 trillion miles.)

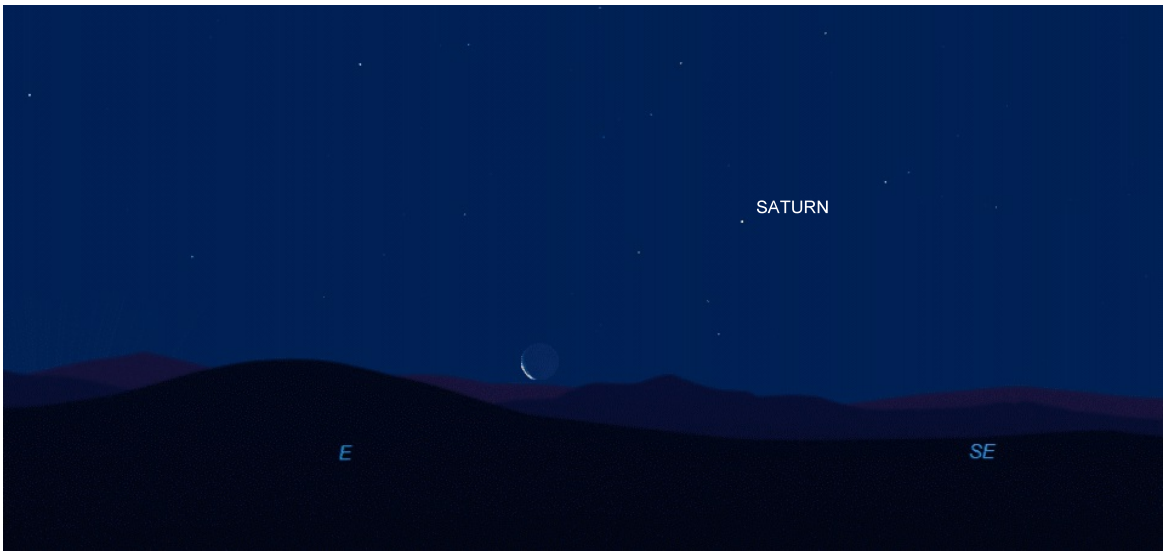


April 14 Head out this evening and take your small telescope or binoculars if you have them. Find the constellation, Gemini, north of showy Orion. Now, find the bright star, Castor, and count down three stars. Does that third star look odd? Turn your telescope or binoculars toward that 'odd' star and see that there is another star on the left and it is really orange. That second star isn't a star at all. It's the planet Mars! Try to watch Mars for the next few nights. See how fast it moves against the starry background?

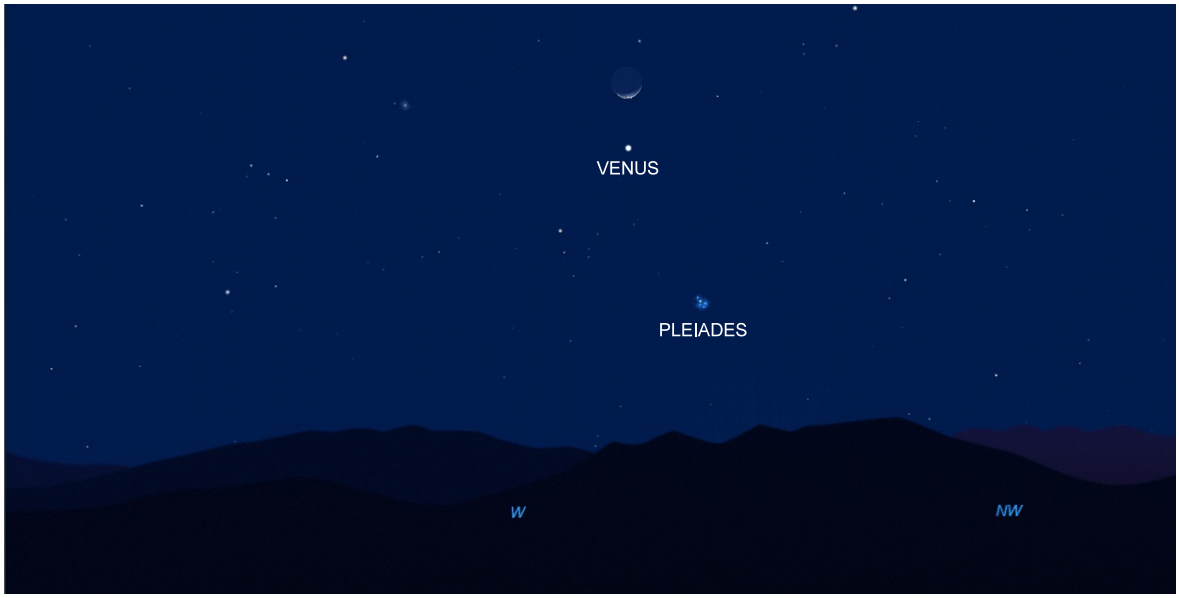


April 16 If you're up before the sun, look east-southeast. You'll see the thin crescent Moon rising as well as Saturn about 5 degrees to the upper right.

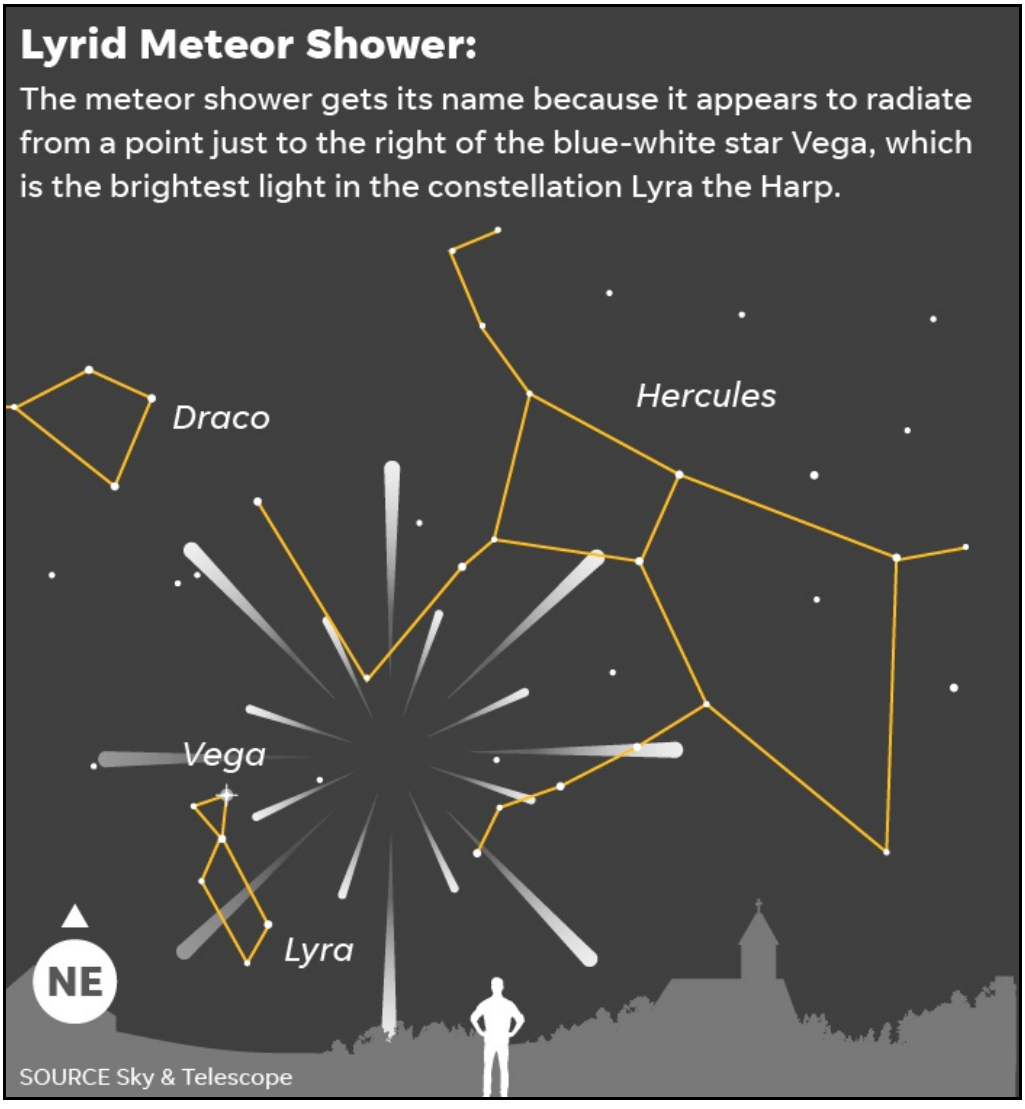
.



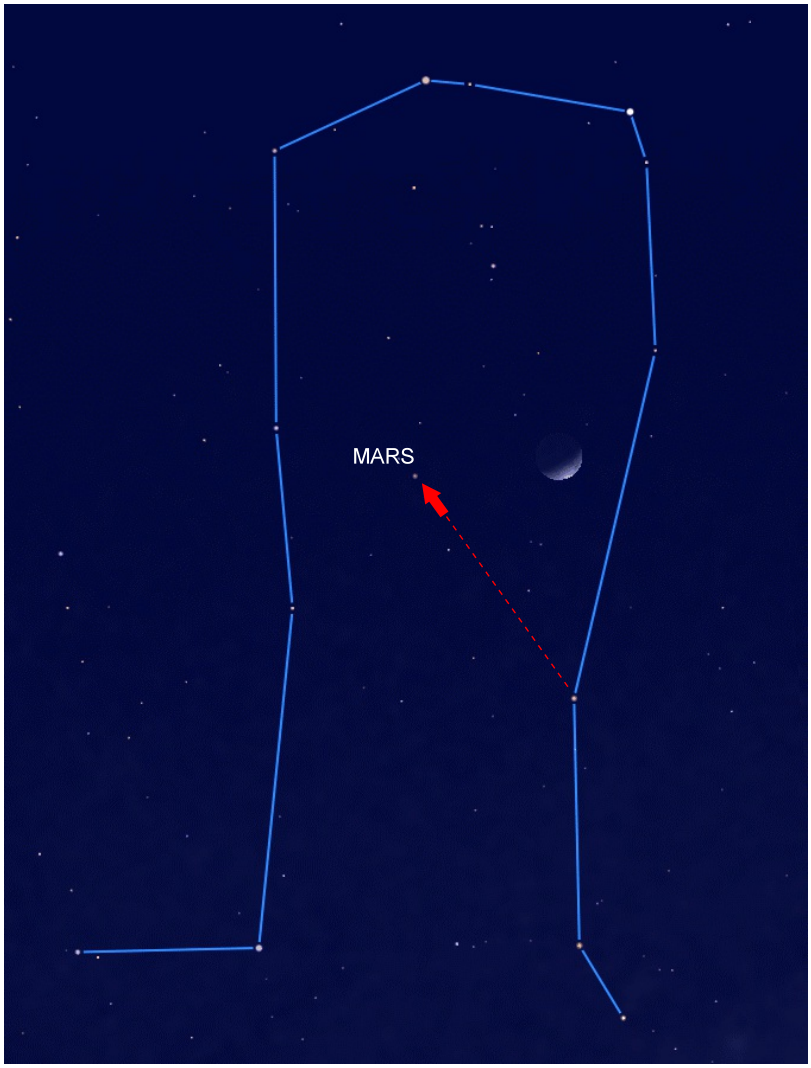
April 22 This evening Venus and the Pleiades are joined by the waxing crescent Moon in a pretty grouping.



April 22-23 Tonight has a double feature. After you see the pretty show with the Moon, Venus and the Pleiades, go to bed and set your alarm for, say, about 3:30AM to get up to enjoy the April Lyrid Meteor Shower. Dress warm or use a sleeping bag, relax and look to see about 15 meteors per hour from the northeast as Lyra rises. The radiant, shown below, points to the direction planet Earth is headed at this time of year.



April 25 Let's return to the constellation Gemini. Now Gemini is lower in the western sky. Enjoy the visit by the waxing crescent Moon. Did you notice that something else has changed? To the left of the Moon, Mars is occupying another patch of celestial real estate!



April 27 Have you noticed a strange new figure painted in the parking lot of the Forestry Outreach Center?

Come to the Center at 7PM, Thursday, April 27 and I'll tell you what has mysteriously appeared here. (No it's not evidence of extraterrestrial visitors and Kayla isn't asking to be beamed-up.)

We will be paying homage to our superhero, Ana Lemma!