

SANDRA F. PRITCHARD MATHER PLANETARIUM NEWS

2020-2021 Season

The Mather Planetarium at West Chester University



Greetings! We hope that you and your families are well during these trying times. With the on-going pandemic, the Mather Planetarium will remain closed through the spring semester. Our virtual shows have been quite popular (thanks to those who have attended!) and we will continue to host them. We have been posting on Facebook various ways to engage in astronomy activities at home. Our doors might be closed but the night sky is always open! Be safe and we look forward to welcoming you back to the dome soon!

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<http://www.wcupa.edu/planetarium>

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@MatherPlanetarium

*"The solar system is off center and
consequently man is too."*

- Harlow Shapley

Up-Coming Virtual Show Dates

January 29, 2021

Our webinars offer a virtual tour of the current night sky. These presentations are free of charge but do require registration.

February 26, 2021

To register for any of the shows, please visit our webpage or Facebook page (see links above).

March 26, 2021

April 23, 2021

We are also offering virtual K-12 classroom visits. Contact us at planetarium@wcupa.edu for more information.

The Reason for the Seasons (and more!)

January is a winter month in the US. The temperatures are low and the threat of snow can be real. However, the Sun is already heading toward spring. The astute observer might have noticed that the daylight hours are growing a little bit longer and the noontime Sun is a little bit higher in the sky than it was a month ago.

The Sun's Altitude

Our seasons are the result of living on a planet that's tipped over. The Earth's rotational axis is tilted 23.5° with respect to its orbital plane. This means that there are times in our orbit when the north pole is tipped away from the Sun and times when it's tipped toward the Sun. The winter solstice - December 21st for the northern hemisphere - is the date when the north pole is tipped directly away from the Sun. From our perspective, the Sun is at its lowest point in the sky on that day. For Pennsylvania, the Sun is a mere 26.5° above the southern horizon at noon.

But the Earth is always on the move! The very next day the Sun starts marching back up to higher altitudes. Since the solstice last month, the Sun has already managed to climb to 30° altitude and it's picking up speed.

The Coldest Month

December is when the Sun is lowest in our sky and when we get the fewest hours of daylight. However, a quick review of temperatures will show that December isn't the coldest month. The chilliest time of years is typically January. That's

because the Earth absorbs and retains heat from the Sun, especially the oceans. There are some atmospheric effects as well but the bottom line is that even though the Earth receives the least sunlight in December it's still holding on to some of the heat from those longer hours of sunlight in the fall. It's a bit like baking... When you take a cake out of the oven it takes a while to cool down to room temperature. The Earth is still releasing that stored heat in December and it doesn't reach its lowest temperature until a month or so later.

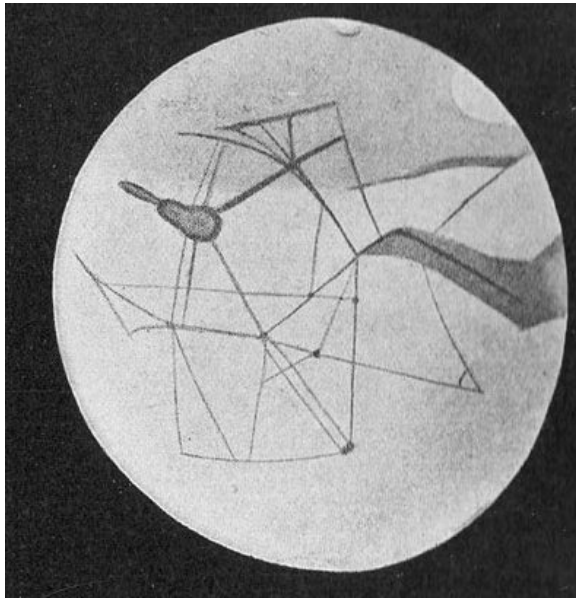
What About Distance?

Many people know that the Earth's orbit isn't a perfect circle; it's an ellipse with the Sun sitting at one focus. This means that the distance between the Earth and the Sun changes during the year. Many folks believe that *this* is the cause of the seasons. However, we can see that the varying distance doesn't explain it because the entire Earth is farther and then closer to the Sun and yet the seasons are *opposite* between the northern and southern hemispheres. If distance were the answer then everyone would have summer at the same time, when we are closer to the Sun. Instead, when we have summer the southern hemisphere has winter. In fact, the Earth is closest to the Sun in January, our coldest month! The seasons are really all about that tilt.

A little bit of a tilt is all it takes to give us the wonder of the seasons - the snowy winters, the flowery springs, the long days of summer, and the colorful leaves of fall.



The Mather Planetarium programming is made possible by generous donations from the community. To learn more about how you can support our educational and public activities, please contact Dr. Karen Schwarz at (610) 436-2788 or at planetarium@wcupa.edu.



Left: Lowell's sketch of the canals on Mars. Right: A Hubble Space Telescope image of Mars.

Looking Up: Mars

If you go outside and look due south after sunset, you'll see a bright red star high in the sky. If you look closely you'll notice that it doesn't twinkle like the other stars. That's because it's not a star at all. It's the planet Mars.

Mars is my favorite planet for many reasons, one of which is its colorful history in popular culture. In the late 1800's observatories were starting to be built with larger and larger telescopes. The larger the scope the more detail that can be seen. One such telescope was the 24-inch Clark refractor at Lowell Observatory in Arizona.

Percival Lowell was a Boston business man and amateur astronomer who was fascinated with Mars. The Italian astronomer Giovanni Schiaparelli had observed Mars and noted linear markings on the surface, which he called "canali" – the Italian word for channels. However, this word was mistranslated in English to canals. At first pass, it might seem that these two words are interchangeable but there's a subtle difference. Channels are typically naturally occurring structures while the word "canal" implies something man-made.

Lowell heard of Schiaparelli's canals, which he then observed himself, and the idea of Martians was

born. The fuzzy image of Mars in Lowell's telescope revealed to him the polar ice caps (which are real), a vast network of engineered canals, and the dark spots where they connected which he termed "oases". Lowell's imagination created a race of beings living on a planet that was desperately arid, forcing them to build a planet-wide irrigation system which brought water from the ice caps to their cities (the oases).

Lowell wasn't the only observer to sign on to this idea that Mars was inhabited by an advanced civilization but most astronomers at the time were skeptical. However, the notion of Martians caught on like wildfire with the public. It spawned books, radio programs, movies, and pop culture that's still with us today. Even when NASA's Mariner missions visited the Red Planet in the 1960's, showing no signs of canals or cities, people refused to let go of the idea.

In my opinion, the true scientific discoveries being made about Mars (with sci-fi like rovers!) are even more exciting than Lowell's Martians. Let's explore those mysteries and leave the aliens to Hollywood.