



## **Roads Scholar Educational Adventures in Our Own Backyard**

By Kathleen Williams  
CRIZMAC Art and Cultural Marketplace

# **Rare Opportunity to View Mercury Transiting the Sun**

The small, rocky planet, Mercury has always been illusive, appearing only a few times a year, usually as the sun is rising or setting. Nevertheless, it has been known at least since the time of the Sumerians (around 3000 BC). The Greeks gave it two names, Apollo when it appeared as a morning star, and Hermes (the Greek equivalent of the Roman god, Mercury) when it appeared as an evening star. The Greek astronomers knew, however, that the two names referred to the same body.

Mercury is visible with binoculars or even the unaided eye, but it is always very near the Sun and can be difficult to see in the twilight sky. Legend has it that many famous astronomers were never able to see Mercury. The combination of a small number of viewing days and uncooperative weather can make it challenging to find the tiny planet. This makes the event that will occur this Wednesday afternoon, if not a “once in a lifetime” opportunity, certainly not one you’ll want to miss. From about noon until 5:00 p.m., Mercury will pass in front of, or “transit,” the Sun. Assuming our weather cooperates, special filter-equipped telescopes will be set up outside the Flandrau Science Center at the University of Arizona for the public to view this relatively rare event.

Transits by Venus are even more rare, occurring only twice in a century. This most rare kind of transit, by Venus, will next be visible in North America on June 5, 2012. Mercury transits the Sun about 13 times a century.

The closest planet to the Sun, and now (since Pluto has been downgraded to non-planet status) the smallest, Mercury speeds around the Sun in a wildly elliptical (non-circular orbit). It travels at nearly 50 kilometers (31 miles) per second, completing a rotation around the sun every 88 days. At its perihelion (the point in the orbit closest to the Sun) it is only 47 million kilometers (29 million miles) away, but at its aphelion (the farthest point from the Sun) it is 70 million kilometers (43 million miles).

Due to its proximity to the sun, temperatures on the surface can reach nearly 430 degrees Celsius (800 degrees Fahrenheit), but because there is very little atmosphere to keep it warm, nighttime temperatures can drop to -170 degrees Celsius (-280 degrees Fahrenheit). Only Venus is hotter, but its temperatures are very stable.

For many years scientists thought that the same side of Mercury always faced the Sun. In 1965 astronomers discovered that Mercury completes three rotations in an orbit around the sun. So a day on Mercury lasts almost 59 Earth days.

Mercury is only a little larger than our moon, and smaller than one of Jupiter’s moons (Ganymede) and one of Saturn’s (Titan). Its surface is heavily cratered, similar to our moon, the result of collisions with many meteorites and comets. Surprisingly, radar observations of Mercury’s north pole show evidence of water in the protected shadows of some craters.

If you were on Mercury, you would see some very strange effects. Because of its elliptical orbit, at some latitudes, you would see the Sun rise and appear to increase in size. Then, the Sun would stop, briefly reverse course and stop again before continuing its path toward the horizon and decreasing in apparent size. The sky would always be pitch black except for the Sun, stars and other planets, when visible, because Mercury has almost no atmosphere to cause scattering of light. Gazing out in space you might see two stars: a cream-colored Venus and blue-colored Earth. Gravity on Mercury is only 38% the gravity on Earth. This means that a 100-pound person on Earth would weigh just 38 pounds on Mercury. To calculate how much you would weigh on

Mercury, multiply your weight by 0.38.

Mercury's proximity to the sun makes it very difficult to study. It has been visited by only one spacecraft, Mariner 10, which flew by three times in 1974 and 1975 and mapped 45% of the planet's surface. Unfortunately, Mercury is too close to the sun to be safely imaged by the Hubble Space Telescope. A new mission to Mercury, Messenger, was launched by NASA in 2004. It will begin orbiting Mercury in 2011.

Perhaps by the next time Mercury transits the Sun on May 9, 2016, we'll have received information from this mission and will know more about this mysterious planet. Until then, we can do what human beings have done for centuries. Watch the skies...and wonder.

## **Tune Up Your Mind**

Look for these books and related resources

*The Backyard Astronomer's Guide* by Terence Dickinson and Alan Dyer (Firefly Books, 2002)

*A Child's Introduction to the Night Sky: The Story of the Stars, Planets, and Constellations—and How You Can Find Them in the Sky* by Michael Driscoll and Meredith Hamilton (Black Dog & Leventhal Publishers, 2004)

*Mercury* by Seymour Simon (HarperTrophy, 1998)

*The Planets in Our Solar System* by Franklyn M. Branley and Kevin O'Malley (harper Trophy, 1998)

## **Details**

**What:** Viewing and Demonstrations of Mercury's Transit of the Sun at Flandrau Science Center

**Where:** The University of Arizona, 1601 E. University Blvd. (Corner of University and Cherry)

**When:** Wednesday, November 8. 12 – 5 p.m.

Flandrau's main building, normally closed Wednesday afternoons, will be open for the event, with exhibits and bathrooms available for patrons.

**Admission:** Free event

**Information:** 621-STAR (7827) or <http://www.flandrau.org>

Flandrau's Exhibits and Planetarium are normally open from 6 – 9 p.m. on Thursdays and Fridays, from 12 – 9 p.m. on Saturdays, and 12 – 5 p.m. on Sundays. Observatory hours are 7 – 10 p.m., Wednesday through Saturday.

Since reopening on October 5, 2006, Flandrau has offered a special introductory admission price (though December 2006) of \$2.50 per person for all ages.

## Discovery Detours

### If you go...

See Mercury transit the sun through solar telescopes equipped with safe solar filters provided by the Flandrau Science Center. You will also be able to see eruptions on the Sun's surface and sunspots. Free posters, handouts and NASA postcards about the Sun will be available.

The only transits ever visible from Earth are those of Mercury and Venus. Why do you think that is? Look at a model of our solar system for a big clue or visit [www.crizmac.com](http://www.crizmac.com) and click on the "Roads Scholar" link.

**Answer: We can only see transits of Mercury and Venus because they are the only two planets between the Earth and the Sun**

**Warning:** You should only view the Sun with safe solar filters or eclipse glasses. Do NOT look directly at the Sun without using safe, approved filters. Permanent blindness may occur to those who stare at the Sun with unprotected vision.

## Legends and Stories

People long ago often had legends or stories to explain phenomena they witnessed in the skies, such as eclipses. For instance, in the book *The Moon Was at a Fiesta* (Tortuga Press, 1997), author Matthew Gollub retells a pre-Hispanic legend that explains why the moon is sometimes visible in the early morning sky.

Make up your own story that would explain Mercury's transit of the sun. If you didn't know the scientific explanation, how might you explain the small black dot passing across the sun's surface?

## Fuel for Thought

### Did you know...

In Roman mythology, Mercury is the fleet-footed messenger of the gods, and the god of commerce, travel, and thievery. As such, he had to be a very fast god. The planet probably received this name because it moved so quickly across the sky, popping up on one horizon for a few days, only to disappear and then pop up on the other horizon some time in the future.

In chemistry, a heavy, silvery metallic element is used in thermometers because it expands and contracts rapidly in response to changes in temperature. That element is also called "mercury." Given what you now know about Roman mythology, why do you think it might have been given this name?

## Think Tank

### Discussion questions for the whole family to consider:

The word "mercurial" is derived from the planet Mercury and the Roman god who was its namesake. Based on what you now know about both, what do you think this word means? Look it up in a dictionary or visit [www.crizmac.com](http://www.crizmac.com) and click on the Roads Scholar link to check your answer.

Consider facts and details you know about other planets in the solar system. What words can you make up that are based on characteristics of these planets? For instance, you might decide to use the word "jupitarian" to refer to someone who always has a lot of friends surrounding them (like the moons of Jupiter).

**Definition: The word “mercurial” is commonly used to refer to something (or someone) erratic, volatile or unstable.**

### For the Mouse-bound

<http://www.flandrau.org>

<http://sunearth.gsfc.nasa.gov/eclipse/OH/transit06.html>

<http://www.enchantedlearning.com/subjects/astronomy/planets/mercury/>

### **Wheels Are Turning**

Parents and Caregivers: These activities can help your child meet Arizona’s educational standards. The standards addressed here include:

6SC-R1. Identify basic phenomena and changes in the sky (K)

6SC-F2. Identify the planets and their relationship to the Sun (Grades 1-3)

6SC-F4. Identify and describe the patterns of movement of objects in the sky (Grades 1-3)

6SC-E2. Describe common objects in the solar system and explain their relationships. (Grades 4-8)