

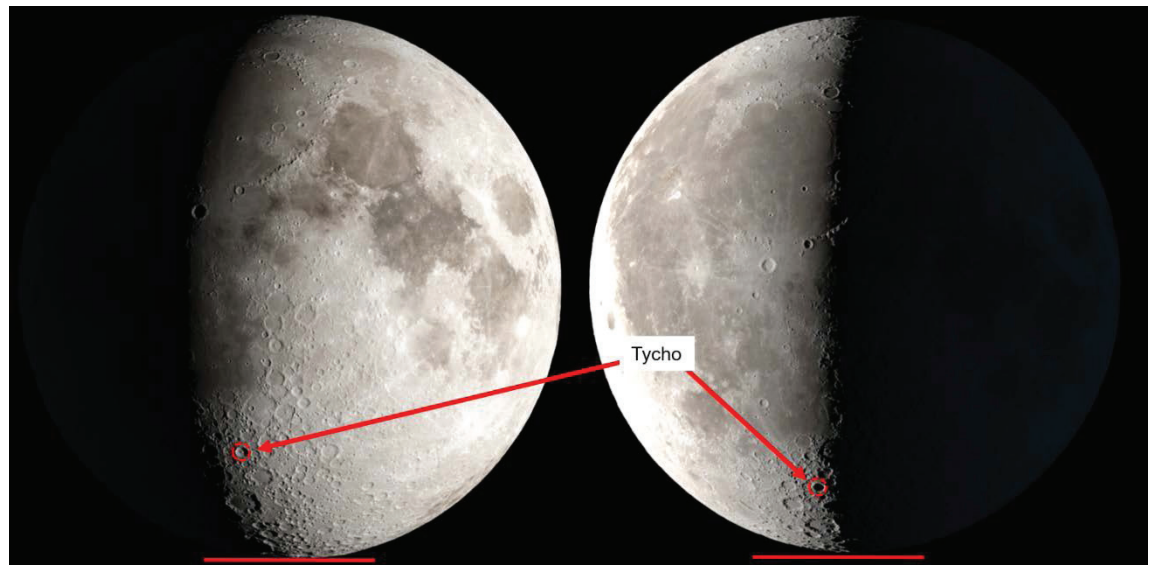
WHAT'S UP?

Hello, again. This week, I'll finish up our tour of the Moon. Over this weekend, the Moon will move from a 19½-day-old Moon on Friday to the Third Quarter Moon on Sunday night. At the 3Q mark, we will again see the Moon lit as a semi-circle in our sky. Compared to the First Quarter Moon though, this time it will be the left-hand (western) side of the surface that is in sunlight. The right side is now in the midst of its two-week-long night. Observing the Moon over the week ahead can be challenging because as I noted two weeks ago, the 3Q Moon rises at midnight. You need to be someone that either has to get up before dawn or is good at responding to your alarm clock. By Sunday night, Mare Tranquillitatis, Serenitatis, Fecunditatis, and Nectaris are all in darkness – as are the Apollo 11, 16, and 17 landing sites. The Apollo 15 site near Montes Hadley is just on the terminator now. Remember Rupes Recta – the 60-mile-long cliff in Mare Nubium? Take another look now that the Sun is setting on the ridge. Instead of seeing a dark straight line caused by the shadow of the ridge as the Sun rose over the site, you'll see a bright straight line. That's the face of the cliff fully-lit by the Sun. These constantly shifting views of lunar features are not only fascinating, but can tell us a lot about the configuration of what we are seeing.



Those of you with telescopes and binoculars should shift your gaze towards the south pole of the Moon. There you'll find a broad round crater with many smaller craters inside of it. This 136-mile-wide crater is *Clavius*. Any fan of the 1968 film *2001: A Space Odyssey*, will remember that the first monolith was discovered during an excavation at Clavius Base. As you look at the crater, try to imagine a future lunar colony there! Christophorus Clavius was a 16th-century German mathematician and astronomer. Just as maria have smooth surfaces caused by the flow of lava after a large object struck the Moon, so too, Clavius has a smooth surface. The craters inside of Clavius were caused by meteor strikes that occurred after Clavius' bottom had formed and solidified. Instances of craters upon craters help scientists construct a timeline of the Moon's history. Newer craters are formed on top of older ones. Just above Clavius is another large (88-mile-wide) crater, *Longomontanus*. Longomontanus is named after the 17th-century Danish astronomer, Christen Sorensen Longomontanus. Longomontanus was an assistant of Tycho Brahe at Brahe's research center, *Uraniborg*, on the island of Hven. It is in honor of this early observatory that my backyard observatory is named *Uraniborg West*.

From the time of the 9-day-old Moon (on June 29th) and Monday (July 13th), another of the Moon's librations has been noticeable. Back on the 29th, the Moon was tipped up 5½ degrees and we could see beyond the Moon's South Pole. Now, on the 13th, the Moon is tipped down by 6 degrees, and we can see past the lunar North Pole. In last week's *What's Up?*, we used the distance between the edge of the Moon and Mare Crisium as a guide to the libration in longitude. The figure here shows how we can use the distance between the southern edge of the Moon and the crater Tycho to indicate the amount of the libration in latitude. With practice, you too can use these features to become more in synch with the movements of the Moon.



On July 20th (besides being the 51st anniversary of the Apollo 11 landing on Mare Tranquillitatis), the Moon once again is at the New Moon phase, and the beat goes on...

There are, of course many, many more interesting features to see on the lunar surface besides the few that I have described over the past month. If I've whetted your appetite for observing the Moon, there are some good resources for you to explore. One is the program, *Virtual Moon Atlas* (ap-i.net/avl/en/start). This program allows you to see what the Moon looks like at any time and includes labels of the features. A web-based app using images from the Lunar Reconnaissance Orbiter and created by NASA's Scientific Visualization Studio has animations of our changing view of the Moon at any date and time (svs.gsfc.nasa.gov/4768). The graphics show the shadowing and librations that I've discussed in this series of articles. And, as I've said before, there is no substitute for keeping a journal to log your observations. The Astronomical League has two lunar observing challenges that you can participate in (astroleague.org/al/obsclubs/lunar/lunar1.html). These are no-pressure, no-timeline, no-competition programs. They provide a great framework for your lunar observing.

You can reach me at astroblog@comcast.net with any questions and comments you have. This is *What's Up?* Installment #25.

Until next time, Keep looking up!

Barry

What's Up correction

Barry sends his apologies for a small editing error in last week's installment: The fourth sentence of the second paragraph reads, "A gibbous moon is the shape when the Moon is between New and 1Q and Full and 3Q." It should read, "... between 1Q and Full and Full and 3Q." Very sorry for any misunderstanding this may have caused.