

WHAT'S UP IN FEBRUARY

By Bernie Reim

The month of February is named after the Latin term februum, which means purification. The Roman purification rituals named Februa were held every February 15 on the old Roman calendar.

We have already reached the middle of winter as of February 2nd, which is commonly known as Groundhog Day. This is our version of the original Celtic cross-quarter days which divide each of our four seasons in half. Candlemas is their name for Groundhog Day. Then the halfway point between spring and summer is called Beltane, which is the same as our May Day. Then we have Lammas Day on August 1, halfway between summer and fall. That word means "loaf mass" which marked the beginning of the wheat harvest. Then our Halloween is Samhain or "summer's end" in the Celtic tradition. The seasons are important turning points to understand the earth and its motions better, but it is also important to understand the midpoint of those seasons.

This month of February will not be quite as dramatic as January was this year, but every month is always unique and different and it is always well worth getting outside under the night sky for a while as often as you can. At least the days are getting noticeably longer now and the days will be nearly 11 and a half hours long by the end of this month, with just 3 weeks to go until the vernal equinox gets here once again. The sun will feel a little stronger and higher each clear day this month.

The other highlights include Venus reaching its greatest brilliancy for the year on the 12th at minus 4.9 magnitude, which is a full magnitude or two and a half times brighter than it is when it reaches its least brilliancy at minus 3.9 magnitude. We started last month with four planets visible in the evening sky. Now three of those planets have migrated to the morning sky, creating a nice morning line-up for us with 4 bright planets, since Mars was already there. Look low in the eastern sky half an hour before sunrise to spot this nice celestial slowly-moving dance. Venus will be the highest, and then Mars, then Mercury, and Saturn will be the lowest one in our sky. Watch this on the 27th when the waning crescent moon will join this quartet of planets, producing a great show in Sagittarius just below the Summer Triangle. Jupiter remains as the only evening planet, low in the western sky, but we will lose it completely by the middle of the month.

There will be no more meteor showers until the Lyrids on April 20th, so we will have to make it through this drought until then. However, you can still catch up to 3 or 4 stray meteors every hour from a dark sky site. The largest asteroid, Ceres, will track right through Taurus between the Hyades and Pleiades open star clusters all this month. Ceres is now a dwarf planet along with Pluto, but it used to be a full-fledged planet for about 50 years until 1850. Ceres is 600 miles across, or about the size of Texas. It will reach 8.5 magnitude, or about 10 times fainter than anything you could see with the naked eye. The first quarter moon will pass very close to Ceres on the night of the 8th into the morning of the 9th.

The James Webb Space Telescope had a perfect launch on the morning of Christmas Day, the ultimate Christmas gift that will keep giving for 10 more years or so. As of 23 days after its launch, it is already 92% of its way to its destination at the L2 point way out beyond the moon about a million miles from Earth. It is now traveling at only about the speed of sound, only one mile in 5 seconds. All of its mirrors have been fully deployed along with its tennis-court sized sunshield to keep it cold enough to observe in the infrared instead of the visible wavelengths

like the Hubble Space Telescope does. It is 132 degrees F on the hot side and 338 degrees below zero F on the cold side, nearly a 500 degree difference! It is amazing to me how hot it can get that far out in the cold of space. Thanks to excellent engineering, cooperation, and testing it successfully overcame all of its 355 possible points of failure, any one of which could have rendered this entire 10 billion dollar science experiment useless. Now all that remains is perfectly focusing its 18 hexagonal mirror segments, each one 4.3 feet in diameter for a total size of just over 21 feet in diameter, which is nearly 3 times larger than the Hubble's 8 foot mirror. Then they will also deploy and test many of its other instruments. This whole process will take another 4 months at least, so we won't be ready for real results and great new photographs until late spring.

The Webb will be 100 times as powerful as the Hubble, which is still working after over 31 years in orbit. The Webb will also be able to see much farther back to the beginning of our universe to see exactly how black holes, galaxies, and stars first formed along with studying exoplanets in much more detail and even looking at our own planets. This is truly one of the most complex marvels of engineering that humans have ever built, taking about 30 years of careful and detailed work, longer even than the time to build the great Egyptian pyramids at Giza, the ultimate remote control robot of discovery far out in space that all of us have some ownership interest in.

There will not be any good comets this month, but Comet Borrelly will track from Pisces into Aries all this month. It will only reach 10th magnitude, or about 50 times fainter than anything you could see with the naked eye, so you would need a good telescope to spot it. There is a very interesting phenomena that starts to become visible this month and next about an hour after sunset low in the western sky. The other time to best see these phenomena, called the zodiacal light, is an hour before sunrise in the southeastern sky in October and November. The reason for those times is that the angle that the ecliptic makes with our horizon is at its steepest at those times of the year for us in the northern hemisphere, allowing this light to become better visible, even though it is always there.

I have only seen this subtle light 3 or 4 times. It is much easier to see far away from any artificial light. This haystack or pyramid of light consists of many trillions of tiny meteoritic particles that form a torus or doughnut-shaped ring along the ecliptic plane of our solar system. You can see them because they reflect the sunlight back to us. You are not seeing only a single comet when you see this enigmatic light, but you are actually seeing the dusty remains of thousands or even millions of long-dead comets.

The size of these tiny particles ranges from 10 to 300 microns, which is a millionth of a meter. By comparison, the width of a human hair is 70 microns, so some of those tiny particles would be visible without a microscope. The particles are continually spiraling into the sun, but new ones are always being created from the dust of comets, asteroids, and meteoroids as they pass through our solar system. Every single day the earth gathers up 140 tons of this dust as we continually orbit the sun at 18.6 miles per second, or only 10,000 times slower than the speed of light. Look for this ethereal cone of light on clear nights with no moon present and get as far away from any towns as you can. The cone-shaped glow will stretch upward through Taurus the Bull.

Venus will be the star performer this month and the rest of the planets will serve as her backup cast. It will rise 2 hours before the sun and remain visible for a while even after the sun will appear. Since Venus turned into a morning planet last month, it will now dazzle us with its

brilliance for most of the month. If you have access to a telescope you can also watch its rapid transformation each morning as it changes shape from spanning 49 arc seconds of the sky and being a thin crescent of only 16% to spanning only 32 arc seconds and becoming 38% illuminated by the sun. That is only 60 times smaller than the moon, which always spans very close to 30 arc minutes or half a degree of our sky, which is the same size as the sun.

Watch how Venus is getting smaller in the sky even as it is getting more illuminated. There is a trade-off here and Venus always reaches its greatest brilliancy at 26% lit. That will happen on the 12th. This time Venus will appear brighter than usual on that day since its slightly elliptical orbit will bring it closer to us than on other orbits when it reaches 26% illuminated.

Venus is a very strange planet indeed; it is the only planet in our solar system whose day is longer than its year since it rotates so slowly. Its year is 225 days and its day is 243 days. Venus only rotates at 4 miles per hour, or a fast walking speed. It also rotates in retrograde, so the sun rises in the west once in 243 days. Its surface temperature is about 900 degrees F, hot enough to melt lead. Its surface pressure is nearly 100 what we have on Earth at our surface. You would have to dive 3,000 feet under our ocean to experience the same pressure that is present on the surface of Venus. NASA has two missions planned to study Venus up close, to be launched in 2028 and 2030.

Mars was already a morning planet before Venus joined it. Mars will be about 7 degrees to the right and below Venus in the constellation of Sagittarius, but it will be just over 250 times fainter than Venus. Then Mercury and Saturn will show up below and to the left of Mars, rounding out this morning cast of the great play of our solar system.

Feb.1. New moon is at 12:46 a.m. EST.

Feb.2. The moon passes 4 degrees south of Jupiter tonight.

Feb.4. Clyde Tombaugh was born on this day in 1906. He would discover Pluto on the 18th of this month in the year 1930.

Feb.5. Apollo 14 landed on the moon on this day in 1971, becoming our third manned landing and the last one before we brought along lunar rovers for the last 3 missions. The astronauts were Alan Shepard and Edgar Mitchell. They collected 93 pounds of moon rocks on that trip.

Feb.7. We performed the first untethered space walk on this day in 1984. The Stardust Comet Probe to Comet Wild2 was launched on this day in 1999. It was the first mission to return some samples of dust from this comet and some other cosmic dust to Earth.

Feb.8. First quarter moon is at 8:50 a.m. Jules Verne was born on this day in 1828.

Feb.10. The moon is at apogee or farthest from Earth at 251,591 miles this morning.

Feb.12. Venus reaches its greatest brilliancy today at magnitude minus 4.9. Venus passes 7 degrees north of Mars this morning.

Feb.14. On this day in 1990 Voyager 1 took the first ever family portrait of 6 planets in our solar system including the famous "Pale Blue Dot" image of Earth, inspired by Carl Sagan. The Swiss astronomer, Fritz Zwicky, was born on this day in 1898. He first proposed the existence of dark matter in 1933 and coined the term supernova the next year.

Feb.15. On this day in 2013 the Chelyabinsk meteor exploded a few miles over this Russian city. It was about 50 feet in diameter and left thousands of meteorites on the ground. Galileo was born on this day in 1564.

Feb.16. Full moon is at 11:56 a.m. This is also known as the Snow or Hunger Moon.

Feb.19. Copernicus was born on this day in 1473. He suggested that the sun is really the center of the solar system and Galileo later proved that.

Feb.20. On this day in John Glenn became the first American to orbit Earth.

Feb.23. Last quarter moon is at 5:32 p.m. On this in 1987 the light from a supernova in the Large Magellanic cloud, one of two satellite galaxies to our own Milky Way, was first seen on Earth.

That supernova actually exploded 160,000 earlier, since that is the distance to the LMC.

Feb.27. The moon passes 9 degrees south of Venus and 4 degrees south of Mars this morning.

Feb.28. The moon passes 4 degrees south of Mercury and Saturn this morning.