

WHAT'S UP IN OCTOBER

By Bernie Reim

This is the first full month of fall for us in the northern hemisphere. Our wonderful flaming foliage will transform our terrestrial landscape with brilliant colors even as our celestial skyscape is being changed as part of its continual and much longer cycles. Summer constellations including the prominent summer triangle are slowly sinking lower into the western sky even as winter constellations like Taurus and Orion and the whole winter hexagon are already beginning to rise in the east. Since any given star will rise 4 minutes earlier each night, the entire sky will appear to rotate at the rate of 2 hours each month. So if you look at the sky at midnight now in early October, you will see that same sky at 10 pm in early November and at 8 pm in early December.

This month will host its share of interesting highlights including three evening planets, Jupiter, Saturn, and Venus, and the best morning apparition of Mercury for the year. Of the 5 brightest planets only Mars will be missing since it is too close to the sun now and will not reappear until December in the morning sky. There will also be the usual close conjunctions of the moon with the planets, not one but three comets visible in telescopes, several asteroids at opposition and a meteor shower, the Orionids on the 21st.

Both Saturn and Jupiter will end their retrograde or westward motion this month. Saturn will do that on the 10th and Jupiter will do it on the 18th. They are both at opposite ends of Capricorn the Sea Goat now. Saturn rises first in the western end of Capricorn and then Jupiter rises in the eastern end of Capricorn about an hour later. They are both up already by the time it gets dark enough to see them. Since Jupiter is about 15 times brighter than the ringed planet, you will see it about half an hour before it gets dark enough to spot Saturn. They are both getting slightly smaller and fainter now as the earth is pulling farther ahead of them in our faster orbit around the sun.

I had some of my best views of Saturn through our 8 inch Zeiss reflecting telescope at the observatory in Kennebunk at our recent annual Star fest. I could clearly see the Cassini division in the rings of Saturn, the shadow of the rings on the planet, the shadow of Saturn on its rings, and several of its 82 moons. Then we also witnessed some nice shadow transits of several of the Galilean moons across the face of Jupiter, which has 79 known moons as of now.

Mercury reaches inferior conjunction with the sun on the 9th. That is when a transit across the face of the sun is possible, but the sun, Earth, and the planet have to be lined up perfectly for that to happen, which will not be the case this year. The last transit of Mercury was on May 9 of 2016 and the next one will not be until November 13 of 2032. Notice that Mercury transits always have to happen in May or November. We get about 13 of them per century.

Venus transits are much less common; we get less than two per century. They occur in a strange pattern of 8 years apart and then a large gap of 105.5 years, with the next 8 year gap followed by an even larger gap of 121.5 years. I was fortunate to see both of the last Venus transits, in June of 2004 followed by one in June of 2012. Through a telescope with a good solar filter I was treated to a wonderful and unexpected sight. I could clearly see the brilliantly glowing semicircular arc of the dense and poisonous atmosphere of Venus starkly contrasted against the blackness of space as the planet was just exiting the sun for about 2 minutes.

Mercury starts climbing into the morning sky right after its conjunction with the sun and it will become visible about an hour before sunrise for the last two weeks of this month low in the

eastern morning sky. Since our first planet reaches greatest western elongation from the sun at 18 degrees on the 25th, this will be its best morning apparition for this year.

Even though we can't see Mars now in our skies for several more months, we should keep in mind that all of the current missions on Mars involving three different countries are doing very well and producing some good science to further our understanding of this planet and prepare us for humans to walk on its surface within the next couple of decades. The Perseverance Rover came up empty with its first attempt at drilling a rock sample, but living up to its name, it corrected the problem and succeeded the next time.

It has 43 sample tubes to fill that will be collected by a future mission and blasted off the Martian surface and returned to earth in about 10 years, marking the first time in the 200,000 year history of modern humans that we have returned anything from a neighboring planet. We have returned 842 pounds of moon rocks 50 years ago, but that was much easier to do because the moon is so much closer to us.

We expect to capture ancient water bubbles in these samples along with evidence of microbial life. We are in the perfect place to do this, right in a river delta which used to flow into a lake which is now the 25 mile-wide dried lake bed called the Jezero Crater. The Ingenuity helicopter is providing great reconnaissance, having already flown more than a dozen flights and providing high resolution color images of places that the rover could not reach and helping to map its exploration route safely.

The 3 comets visible in telescopes this month are Churyumenko-Gerasimenko and ATLAS in Taurus and Comet Faye in Orion. They will reach 10th or 11th magnitude, or about 100 times fainter than anything you could see with the naked eye, so you would need at least an 8-inch telescope.

The Orionid meteor shower peaks on the 21st, but that will be near the full moon this month, so that will wash out most of its expected 20 meteors per hour. Since this shower is created by Halley's Comet, you will be seeing tiny sand grain-sized pieces of this famous comet returning to Earth only to be vaporized in our atmosphere. This happens again on May 5 during the Eta Aquarids, also caused by Halley's Comet. The comet itself will next return in 2062 with a much better show than it gave in 1985-86.

The four civilians that recently splashed down into the Atlantic near where they launched into space from Cape Canaveral 3 days earlier made history and ushered in a whole new era of space tourism. They made 54 orbits around the earth during those 3 days, since it only takes 90 minutes to complete one orbit. They went up to 360 miles above the earth, fully 100 miles higher than the ISS orbits and they had a much better view than the astronauts since they also had a much bigger 180-degree window. For those short 3 days we had 14 humans in orbit around our planet, more than ever before in our entire history. There are 7 astronauts aboard the ISS and 3 Chinese astronauts that are building the Tiangong Chinese space station by the end of 2022.

Oct.4. On this day in 1957 the Russians launched Sputnik 1, the first satellite ever, marking the beginning of the space age.

Oct.5. On this day in 1923 Edwin Hubble discovered Cepheid Variable stars in the Andromeda Galaxy and used them to estimate the distance to that galaxy.

Oct.6. New moon is at 7:05 a.m. EDT.

Oct.7. Neils Bohr was born on this day in 1885. He was one of the original founders of the revolutionary new understanding of the universe at the tiniest scale, quantum mechanics. Many

other great physicists like Dirac, Heisenberg, Pauli, Shroedinger, Planck and others contributed to those great paradigm-shifting discoveries.

Oct. 9. The moon passes near Venus this evening. Kepler's supernova was first seen on this day in 1604 in the constellation of Ophiuchus the serpent-bearer.

Oct. 10. Saturn is stationary and ends its retrograde motion today.

Oct. 12. First quarter moon is at 11:25 p.m.

Oct. 14. The moon passes 4 degrees south of Saturn this evening. The first supersonic flight was accomplished on this day in 1947.

Oct. 15. The moon passes 4 degrees south of Jupiter this evening.

Oct.16. Venus passes just north of Antares in Scorpius this evening.

Oct. 18. Jupiter is stationary and ends its retrograde motion today.

Oct. 20. Full moon is at 10:57 a.m. This is also called the Hunter's Moon.

Oct. 21. The Orionid meteor shower peaks tonight.

Oct. 28. Last quarter moon is at 4:05 p.m. EDT.