

WHAT'S UP IN FEBRUARY

By Bernie Reim

The month of February is named after the Roman festival Februa, which are rites of purification. The second day of this month is always Ground Hog Day, which marks the halfway point of winter. We will have at least 6 more weeks of winter here in New England regardless of whether or not Punxsutawney Phil sees his shadow.

There are several interesting highlights this month that will make it well worth braving the cold as winter settles in after a mild start. The nights are getting shorter, but they are still plenty long enough to take in all of the wonders of the sky that our little local slice of the galaxy can offer.

These highlights include a very close conjunction of our two neighboring planets, Mars and Venus late this month. Three planets, Mercury, Venus and Mars are still visible in the eastern morning sky until Mercury drops out early this month and Venus sinks lower even as Mars climbs higher. The second largest asteroid, Vesta will be visible in Taurus near M1, the Crab nebula. Not one but three comets will be visible this month with a small telescope. Jupiter in Aries the Ram and Uranus just to the east of it in Taurus the Bull are still visible, but getting a little fainter each night. This will be your last chance to catch Saturn in Aquarius in the evening sky. It will sink into the twilight around the middle of the month and will reappear in the morning sky in late March, about when spring starts. There are no major meteor showers until the Lyrids in early April, but you can see the zodiacal light in the western evening sky about an hour after sunset this month and next. This light is caused by the trillions and trillions of tiny dust particles from comets reflecting sunlight back to us. So you are essentially seeing all of the comet dust at once, but it is not falling through our atmosphere to burn up and create those brilliant flashes of light that are so thrilling and remind us that we have an atmosphere that only extends about 60 miles into space, which is extremely thin compared to our radius of 8000 miles.

The Winter Hexagon is now at its highest. It includes 8 of the brightest stars in the winter sky in 6 different constellations. You can start at the top with Capella in Auriga the Charioteer. Think of it as "cap on the sky". It is about two and half times as massive as the sun and 12 times as large. It is located about 42 light years away. Then move clockwise to Aldebaran in Taurus the Bull. This orange giant star is 65 light years away and about 40 times larger than our sun but only about twice as massive. It is orbited by at least one exoplanet, Aldebaran b, about 6 times larger than Jupiter. Then keep going another 15 degrees and you will encounter Rigel, a blue supergiant star in Orion. It is about 865 light years away, 80 times the diameter of our sun and 20 times as massive. It is only about 8 million years old but since it is burning through its fuel so fast, it will only live for about another million years. Then the supernova it will create will either become a neutron star or even a black hole if what are left is more than 3 solar masses.

Next you will encounter Sirius in Canis Major, the brightest star in the whole sky at minus 1.4 magnitude and only 8.8 light years away. Think of it as "seriously bright". It has a white dwarf orbiting it simply named Sirius b. A white dwarf is a dead star that shrank down to the size of the earth after it blew up when it ran out of fuel and became a planetary nebula. That is the fate of about 90% of the stars in the galaxy including our own sun in about 5 billion years. Then you will run into Procyon in Canis Minor. It is about 12 light years away and twice the diameter of our sun. It also has a white dwarf orbiting it. Then close out the hexagon or winter circle with

Castor and Pollux in Gemini. Castor, the mortal twin, is about 50 light years away and Pollux, the immortal twin is only 33 light years away and slightly orange in color.

Betelgeuse in the middle of this winter circle or winter hexagon marking the right shoulder of Orion is the most interesting of these 8 stars. Located about 600 light years away, it is 700 times the diameter of our sun and about 20 times as massive. It is one of only a handful of naked eye visible stars that may not even be there anymore since it ran out of hydrogen fuel and is now fusing helium into carbon.

You can create a very interesting historical clock when you relate the distances to these 8 stars to events that happened on Earth during that time in our history. That shows us how long the photons of light have been traveling from those stars to reach your eyes when you look at them on a nice clear night this month. Starting with Sirius, that would only take you back to 2015; the year 196 countries signed the Paris Climate Agreement. Procyon takes you back to 2012; the year the world was supposed to end according to some myths. Next in line is Pollux at 1991, about the time the internet became commercially available for everyone and when the Hubble Space Telescope was launched on April 24 of 1990, forever changing and expanding our view of the universe in many very significant ways. Capella brings you back to 1982. That is when ET became the highest grossing film of the decade. The first Space Shuttle, Columbia, was launched on April 12 of 1981. Then Castor takes you to the last time we walked on the moon in December of 1972. Aldebaran brings you to 1960 when the first humans walked in space, just after the first satellite was launched in 1957.

Now there is a huge gap to the 1400's with Betelgeuse. The printing press was invented in 1436 by Johannes Gutenberg, a German goldsmith, forever changing the course of history and the way we communicate. Then the most distant star of this bright group is Rigel. Its light was traveling for about 865 years which brings us all the way back to the mid 1100's, known as the high Middle Ages, towards the end of the Dark Ages. This was a turbulent time on Earth as the pope instigated the Crusades against Muslims. This was just after the fall of the Western Roman Empire and just before the Mongol Empire under Genghis Khan conquered Persia in 1220.

There was also a brighter side to this time. The University of Paris was founded in 1150 and the famous Italian mathematician, Fibonacci introduced the concept of zero to Europe and the west, forever changing and improving how we do math and what we can learn from this universal language as we apply it. The Magna Carta was created and signed in England in 1215, limiting the power of the king which marked the beginning of modern-day democracy.

Most of the planetary action is still in the morning sky. They are all lined up within 13 degrees in the constellation of Capricorn when the month begins. Mercury and Mars are now over 3 degrees apart. They were less than one degree apart late last month. Then Mercury drops out of the picture in a few days heading towards its conjunction with the sun. It will show up as an evening planet again next month, reaching its highest in our sky towards the end of March about when spring starts.

The main highlight this month will be the very close conjunction of our two next-door planetary neighbors, Mars and Venus. Venus will pass just 0.6 degrees north of Mars on Thursday the 22nd, which is about the width of the full moon, which is half a degree. Notice that Venus is on the way down and Mars is on the way up. Venus will keep getting lower in our morning sky, but it won't disappear completely until May after which time it will just show up in our evening sky again about the time summer starts in June.

This is your last chance to catch Saturn in Aquarius. Notice that a very slender waxing crescent moon will be just below Saturn on the 10th half an hour after sunset in the western sky. We will not lose Jupiter until early May, after which time it will just show up again as a morning planet in June about when summer starts. The king of the planets is still higher and brighter than usual in Aries the Ram, moving in its normal eastward or direct, prograde motion towards the Pleiades open star cluster in Taurus. This cluster, also known as the Seven Sisters or Subaru in Japanese, also offers a great history lesson.

This cluster of 500 young stars is located about 400 light years away, which is the time that Galileo pointed the first telescope ever invented by humans to the heavens in 1609 to begin our significant era of discoveries beyond Earth that has only greatly accelerated since then. Galileo had no idea of the revolutionary recent discoveries like General Relativity and Quantum mechanics, but he was a very good scientist and made many important discoveries like some laws of physics, the moons of Jupiter, the rings of Saturn, the phases of Venus, sunspots on the sun, and many more that were not even believed when people saw them with their own eyes because they simply did not fit into their very limited perspectives at that time. I am sure we are guilty of much of that even today. Einstein had a great quote, "everything has changed except man's way of thinking". Let us not fall into the same traps again today and let us learn from our hard won history so that we can continue to grow and evolve, living together peacefully and sharing our talents instead of fighting all the time.

The zodiacal light is best seen in February and March in the evening sky about an hour after sunset, when it is also called the false dusk. When it shows up an hour before sunrise in the morning sky in October and November it is called the false dawn. I have seen this phenomenon 3 or 4 times and it can be very subtle yet thrilling at the same time. It forms a pyramid or haystack of light which can shimmer almost as bright as the Milky Way galaxy at times from a dark sky site with no moon to interfere. This cone of light will extend through Aquarius, Pisces and Aries, engulfing Saturn, Neptune, and Jupiter, and right up to the Pleiades if all of the conditions are right.

Feb.2. Last quarter moon is at 6:18 p.m. EST.

Feb.4. Clyde Tombaugh was born on this day in 1906. He would discover Pluto using a blink comparator when he was just 24 on the 18th of this month in 1930. It remained a full-fledged planet for 76 years. The moon passes just 0.6 degrees north of Antares in Scorpius.

Feb.7. The moon passes 5 degrees south of Venus this morning.

Feb.8. Jules Verne was born on this day in 1828. The moon passes 4 degrees south of Mars this morning. The asteroid Vesta is stationary in Taurus.

Feb. 9. New moon is at 5:59 p.m.

Feb.10. The moon passes 1.8 degrees south of Saturn this evening.

Feb.14. On this day in 1990 Voyager 1 took the first portrait of planets including Earth and the moon from deep space, 3.7 billion miles away, beyond the distance to Pluto. This iconic image inspired Carl Sagan's book PALE BLUE DOT, a Vision of the Human Future in Space.

Feb.15. Galileo was born on this day in 1564. The moon passes 3 degrees north of Jupiter and Uranus this evening.

Feb. 16. First quarter moon is at 10:01 a.m.

Feb. 19 Nicolaus Copernicus was born on this day in 1473.

Feb.20. John Glenn became the first American to orbit Earth on this day in 1962.

Feb.22. Venus passes 0.6 degrees north of Mars this morning.

Feb.23. Supernova 1987a was first seen on this day in 1987. It was seen in the Large Magellanic Cloud, a satellite galaxy of our own. It actually exploded 160,000 years ago, since that is its distance from Earth.

Feb.24. Full moon is at 7:30 a.m. This is also known as the Snow or Hunger Moon.