WHAT'S UP IN FEBRUARY

By Bernie Reim

The month of February is named for the word Februa, which are the ancient Roman rites of purification. We can all do some of that this month as we look up into the cold mid-winter skies to ponder what is really out there beyond the earth and to get more in tune with both the terrestrial and celestial wonders that we don't understand yet.

We have already reached the mid-point of winter every year on Groundhog Day on the second of this month. This is one of 4 cross-quarter days each year, marking the halfway points of our 4 seasons. Groundhog Day is also known as Candlemass, which is a Christian Holiday.

The highlights for this second month of the year include a continuation of the great planetary parade in our evening skies. Six of the seven planets will all be visible in the early evening sky, nicely lined up along the ecliptic which marks the plane of our solar system They are concentrated towards the western half of our sky. The only remaining one, Mercury, will join the parade late this month very low in the western sky close to Saturn.

We will lose Saturn at the end of the month and Mars will end its retrograde motion on the 23rd. The moon will cross directly through the Pleiades open star cluster and a faint comet will be visible in Leo with a good telescope. There will be several nice conjunctions with the moon and planets this month forming some nice shapes since there are so many planets close together now. The remaining good highlight this month will be the zodiacal light. It will be best visible during the last week this month when the moon is close to new.

The word planet comes from the Greek word "planetes" which means wanderer. The planets seem to be wandering amongst the zodiac constellations as if they are lost, but they are actually very predictable for hundreds of thousands of years simply following some basic laws of math and physics as discovered by Isaac Newton in 1687, 78 years after the telescope was invented.

The planets are always aligned since they are all in the same plane of the solar system and moving in the same direction, but the unusual part is that they are all visible now at the same time in the early evening sky. You would need a telescope or good pair of binoculars to see Uranus and Neptune. That happens about every 5 or 10 years. They could also all be lined up in our morning sky or they could even be lined up in order from Mercury out to Neptune, which just happened in June about 5 years ago.

The exact positions of the planets in our night sky in relation to the stars and the moon is somewhat different every single night, so every single night is really unusual and special, but that by itself does not make it any more interesting than any other night. What is really exciting about every clear night is that we are here at all amongst the planets and stars and galaxies and able to contemplate them, even though there is so much we don't know about them yet.

Mars has retrograded back into Gemini now. Notice that this bright orange object has gone past forming a line with Castor and Pollux in Gemini, instead forming a triangle with these two stars. The red planet will end its retrograde or westward motion against the background of stars on the 23rd. After that it will return to its normal eastward motion for the next two years until its next opposition in 2027. Mars had become as bright as the brightest star in our sky, Sirius in Canis Major back on January 16. Notice that it is slowly fading out a little each night now, but it will still be much brighter than usual for the rest and this winter and into spring.

Mars even went through a fairly rare occultation by the moon last month on the 13th. It was cloudy here, but I did catch a live feed of Mars popping back out from behind the moon around

10 pm from a telescope at Griffith Park in LA, currently under siege by those horrific wildfires that we are still battling. Anytime that a dramatic and photogenic event such as that one is not visible from your own location or you happened to experience cloudy or worse skies, remember that you can always catch a live feed of that event from somewhere on Earth. Slooh.com, the San Francisco Exploratorium, the Weather Channel, and National Geographic all run excellent video feeds along with many accomplished amateurs with the right equipment.

If you can get access to a telescope, you will be able to see some features on Mars now and for the next month or so while it is still fairly close to Earth. I have seen dark markings, both polar icecaps, a bit of the thin atmosphere on Mars which is only 1% of ours, and some people in our astronomy club have even seen both moons of Mars, Phobos and Deimos, when Mars was at its closest in 60,000 years back on August 27 of 2003 when it was only 35 million miles away. This time it only got as close to us as 60 million miles on January 16.

Now we continue our westward journey through this great parade of planets all wanting to be seen in our evening sky. The next one we encounter is Jupiter, one constellation to the west of Gemini. The King of the planets is now in Taurus, where it will be for one full year. Jupiter will end its own retrograde motion on February 4. Then it will seem to reverse direction in Taurus moving away from Aldebaran and the Pleaides again and towards Mars in Gemini. Jupiter was at opposition on December 7 of last year and it spends about 2 months on either side of its opposition in retrograde each year. Notice that you can see all 4 of Jupiter's large Galilean moons with just a good pair of binoculars.

Then there is a large gap until we reach Venus in Pisces, but the planets Uranus and Neptune, the last two planets in our solar system are hidden there, visible only in a telescope or good pair of binoculars. You would encounter Uranus first in Aries, near where the sun was back on April 8 of last year during that spectacular total solar eclipse where Maine had the best weather in all of North America against all the odds!

I saw that one and shared the unique experience with about 5,000 other people from the Height of the Land overlook in Rangeley, Maine. At an altitude of 1700 feet, I could see the moon's shadow starting to sweep over the dramatic landscape fringed with mountains and dotted with frozen lakes for about 20 seconds before it engulfed all of us like a tidal wave of pure darkness. The two brightest planets, Venus and Jupiter, became instantly visible along with a few of the brighter stars. Two feet of freshly fallen spring snow covered the landscape forming a wonderful terrestrial backdrop for the marvelous celestial event going on above us.

To stake out a good spot in this prized real estate, we had to get there early in the morning, about 8 hours before the eclipse even started in the afternoon. It was very peaceful and exciting at the same time to get to stare into the heart of nature at such a beautiful scene right on the Appalachian Trail for 8 hours. The time passed quickly as I talked to many people from around the world who gathered there peacefully and in harmony to share in this unifying show of nature's immense strength and power. People had cameras and telescopes set up, they were playing all kinds of games, several were playing different musical instruments or drawing the wonderful scenery to understand and remember it better. It was a true microcosm of the best the world has to offer and how well we can all get along when our focus is not on ourselves, but on nature's beauty that we are all part of or we could not even have become aware of it.

An eerie 360-degree sunset became visible all around us from this great vantage point for a couple of very short minutes as our brilliant life-giving sun was completely covered by the

invisible new moon. We were right at the bottom of the 240,000-mile-long shadow cone of the moon as it barely reached the earth as it swept all the way from Mexico to Canada in about 2 hours at about 2,000 miles per hour. This shadow that is always there but not usually intersecting with the earth then lifted off again over Newfoundland just a few minutes after it swept over us in central Maine. The tenuous and ephemeral corona or atmosphere of the sun, extending many sun diameters beyond the normally visible 864,000 mile in diameter disk, blazed forth in all of its normally hidden glory for 120 seconds. Several brilliant deep crimson red solar prominences because visible and the sun and the whole landscape looked like nothing anyone had ever seen before.

I was lifted right of the earth to the edge of space, 62 miles up where the sky turns black since there are no more molecules of air to scatter out the short blue wavelengths of light from the sun. I had a glimpse into the inner workings of the solar system and got a sense of the vast scale and the immense and majestic motions always happening there, even though everything in the sky just looks static and fixed for us. Nothing could be further from the truth. It is ironic that the real beauty and power of our sun only becomes visible to humans for a few very short minutes every couple of years or so only when the sun gets perfectly and completely covered by the moon. We have to wait 55 years until 2079 to see that again over Maine, but the next total solar eclipse visible on Earth will happen over Greenland, Iceland, and Spain on August 12 of 2026.

Now we go back down to Earth to continue our little planetary journey from our limited viewpoint on the surface, while being more aware at the same time of what is really going on just above is in our solar system. The next planet we encounter one more constellation to the west in Pisces the Fish, is Venus. The slender waxing crescent moon will be just half a degree to the west of our sister planet on the first of the month. Venus is about 30% illuminated by the sun now and looks like a small version of a waning crescent moon through a telescope.

Then we encounter the invisible last planet in our solar system, Neptune, also in Pisces. At nearly 3 billion miles away, or over 4 hours at the speed of light, Neptune is 4 times larger than Earth and takes 165 years to orbit the sun one time while traveling at 3.4 miles per second or about 7 times faster than a high velocity bullet. By comparison, we are constantly orbiting the sun at 18.6 miles per second, or 67,000 miles per hour, or 5 times faster than Neptune.

Now we are back to visible planets for the last two in our journey through the entire solar system from our own rapidly moving spherical platform, spaceship Earth. Saturn is rapidly sinking low in the western evening sky in Aquarius. Through a telescope you would notice that its rings are very thin now, since they are tilted nearly edge-on to our viewpoint. They will disappear completely next month, but Saturn will also be in conjunction with the sun, so we won't see it for several months until the ringed planet returns to our morning sky.

The last of our 7 -planet parade all visible in our evening sky at the same time is Mercury, also in Aquarius, our first planet in order from the sun. Mercury can only be seen for the last 4 days of this month very low in the western sky right after sunset just one and a half degrees past Saturn. It is 8 times fainter than Saturn which is about 200 times fainter than Venus. You will probably need binoculars and a perfect western horizon to see these last 2 planets.

The last good highlight this month is the zodiacal light. This phenomenon is visible for a couple of months each year when the angle of the ecliptic is steepest with the horizon. That happens about an hour after sunset in late winter and about an hour before sunrise in the

middle of fall. This is also called the false dawn or false dusk. It is composed of trillions of tiny dust particles from comets and asteroids forming a torus around the ecliptic plane of our solar system. We can see it when the sunlight reflects off these particles, forming a pyramid-shaped cone of very faint and subtle light extending from the horizon to about 45 degrees high in the western sky about an hour after sunset. Even though there are no meteor showers now until the Lyrids on April 22, which is also Earth Day, we can actually see the combined effect of all of the dust from comets from thousands of years ago in this subtle and eerily glowing cone of faint light for a few nights twice a year.
Feb.1. The moon and Venus are just two degrees apart this evening.
Feb.4. Clyde Tombaugh was born on this day in 1906. He would discover Pluto on Feb. 18 of 1930. As of 2006 Pluto is no longer a full-fledged planet.
Feb.5. First quarter moon is at 3:03 am EST.
Feb.6.The moon is near Jupiter and Aldebaran in Taurus this evening.
Feb.8. Jules Verne was born on this day in 1828.
Feb.9. The moon is near Mars in Gemini tonight.
Feb.12. Full moon is at 8:55 am. This is also called the Snow or Hunger moon.
Feb.14. The Swiss astronomer Fritz Zwicky was born on this day in 1898. He was the first person to discover that there had to be something like dark matter to hold galaxies together way back in 1933.
Feb.15. Galileo was born on this day in 1564.
Feb.19. Copernicus was born on this day in 1473.
Feb.20. George Smoot was born on this day in 1945. He won the Nobel prize in physics in 2006 for his work with the cosmic background radiation, proved that cosmology is indeed a precise science. John Glenn became the first American to orbit the earth on this day in 1962. Last quarter moon is at 12:43 p.m.
Feb.23. Supernova 1987a was discovered on this day in the Tarantula Nebula in the Large Magellanic cloud, a satellite galaxy of the Milky Way located about 170,000 lights years away. Pioneer 10 left the solar system on this day in 1990.
Feb.24. Mercury and Saturn are just over one degree apart low in the western evening sky right after sunset.
Feb.27 New moon is at 7:46 p.m.