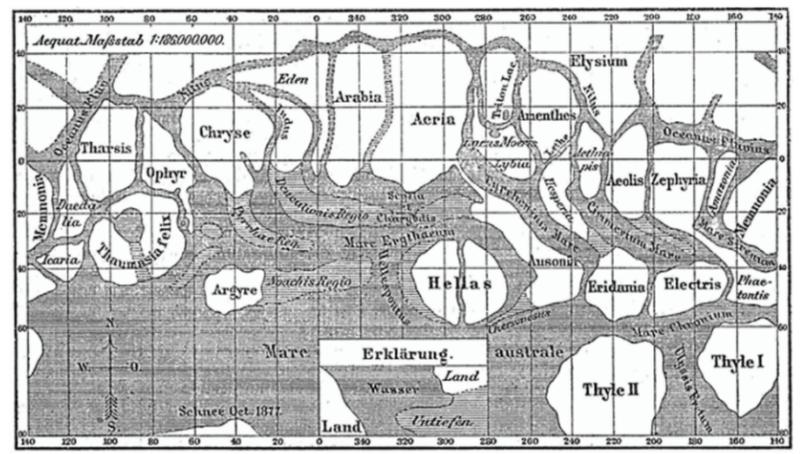


WHAT'S UP?

Hello! It's time for us to visit with Mars. Mars orbits the Sun every 1.9 Earth years. The upshot of this fact is that Earth makes a (relatively) close approach to Mars every 25 months or so, giving us good look at the Red Planet. For this cycle, that closet approach will occur on October 6th. Over the coming month, Mars will appear larger in our telescopes and brighter to our eyes. In fact, Mars will appear 15% larger in diameter and 1.8-times brighter in our night sky over the coming month. Since Mars' orbit is more of an ellipse than the Earth's (remember, Kepler's 1st Law tells us that all of the planets' orbits are ellipses). Some of the Earth-Mars closest approaches are closer than others. At this "closest", we'll be 36.8 million miles away – pretty good as these things go. But, before we get into where to find it and what to look for when we see it, let's talk a bit about Mars.

I think that of all the planets, Mars has captured our imagination the most. In literature (Wells, Burroughs, Bradbury) and on the screen (Flash Gordon, Abbott and Costello (well, almost), and of course, Marvin the Martian), stories about what and who we'd find there abound. Early telescopic views of Mars presented information that was sometimes confusing and conflicting. The use of telescopes in the 1600's revealed that Mars' surface had dark a large dark area (later named *Syrtis Major*) and a white spot at one of the poles. Christiaan Huygens and Giovanni Cassini independently used their observations of Syrtis Major to determine the length of a Mars day – just over 24 hours. Careful study of features on Mars in 1877 led Giovanni Schiaparelli to draw a map showing many long streaks that he referred to as *canali*. Translation from the Italian, gives us "channels". Channels can be natural as well as artificial. However,

canali was mistranslated as "canals" and began the speculation and for some, obsession, that Mars was or at least had been, inhabited by beings capable of creating these canals. Also in that year, Asaph Hall's observations of Mars led to the discovery that Mars was orbited by two moons. The moons are named Phobos and Deimos. The 20th and 21st centuries have allowed us to at first, view Mars from spacecraft flying by the planet (the United States' *Mariner 4* in 1965, was the first successful fly-by mission), then from spacecraft orbiting it (*Mariner 9* in 1971, was the first successful orbiter), and lastly, from spacecraft that have landed on Mars (the USSR's *Mars 3* in 1971, was the first successful landing). Some of these landing craft also deployed vehicles that, controlled from Earth, have roamed the surface and returned a wealth of data. The first of these rovers to successfully explore the surface was *Sojourner*. It was deployed by the United States' *Pathfinder* lander in 1997. The same planetary positioning that makes this year a great opportunity to observe Mars from Earth, also makes it the ideal time to launch missions to Mars. Missions launched now can arrive at Mars with a minimal use of fuel. Currently, there are three spacecraft headed to the planet. In the order of their launch dates, they are: Mars Emirates Mission (an orbiter from the United Arab Emirates), Tiawen-1 (an orbiter and lander from China), and Perseverance (a rover and helicopter from the U.S.). In all, there have been 46 missions to Mars launched from Earth. 25 have been fully or partially successful and 3 are still on their way to the Red Planet.



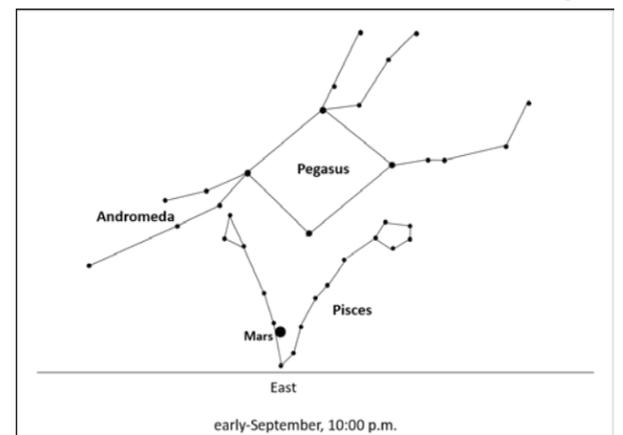
Giovanni Schiaparelli's 1877 map of Mars



Mars (image: Courtesy NASA/JPL-Caltech)

Where, when, and how can we observe Mars in the coming weeks? Mars rises earlier and earlier each day and can be found low in the East by 10 p.m. at the beginning of September and by 8 p.m. at the end of the month. It will be its closest to Earth on October 6th. In the sky, Mars can be found among the stars of the constellation *Pisces* (the fishes). Mars is so bright that I'm sure you can find it, but just in case you're not sure, straight up above *Pisces* will be our old friends *Pegasus* and *Andromeda*. You can use them as your guides down to Mars. As you look at Mars over the coming weeks, try to compare its position relative to the stars. If you do, after a while, you will notice that it appears to be moving from east to west relative to the stars – it is in retrograde motion. Mars' retrograde motion begins on

September 9th and continues until November 14th. Then it will resume its west-to-east motion relative to the stars. For a refresher on why the outer planets appear to move backwards in our skies once a year, take a look at *What's Up?* Installment #20 (May 22nd). Over the course of the month, Mars will become 50% brighter than it is now – and, at magnitude -1.9 now, it's already very bright! Mars will also appear about 15% larger than it currently does. Together, these changes mean that the view in even a small telescope will provide a glimpse of some of Mars' surface features. The two main things to look for are a brightening at one edge of the planet (the South Polar Cap) and an overall mottled look to the surface – light and dark areas. Larger telescopes will provide detail in the pattern of light and dark areas. The most prominent dark feature is Syrtis Major, an area of dark basaltic rock around a shield volcano. If you are viewing Mars through a telescope, an orange filter inserted into the eyepiece will increase the contrast between the light and dark areas and make the dark areas stand out more.



If you want more information about Mars, check out the NASA website, mars.nasa.gov, for all things Mars!

You can reach me at astroblog@comcast.net with any questions and comments you have. This is *What's Up?* Installment #29.

Until next time, Keep looking up!

Barry