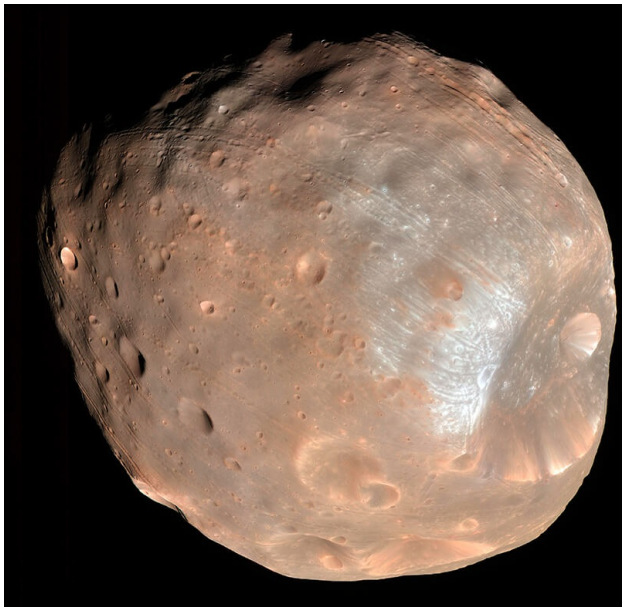
TODAY IN SCIENCE: A MOON FOR MARS

American astronomer **Asaph Hall** discovered Phobos, one of the two known Martian moons, on 17 August in 1877.

He found the other moon, which we call Deimos, an even smaller moon than Phobos, later that year. Both Martian moons look more like asteroids than they do like Earth's large companion moon.

Astronomers named the two moons Phobos and Deimos – Fear and Terror – for the horses that pulled the chariot of the Greek war god Ares, counterpart to the Roman war god Mars.

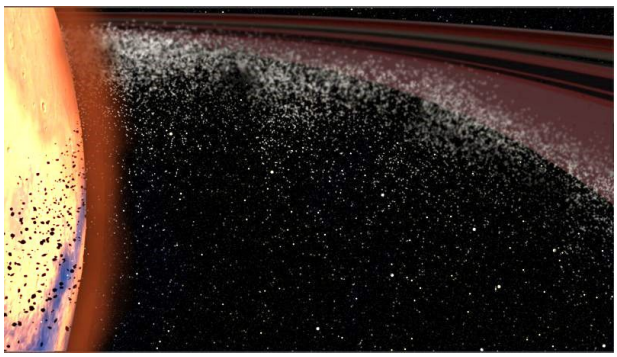


The Martian moon Phobos, seen here in a photo taken by NASA's Mars Reconnaissance Orbiter from 4,200 miles.

Phobos is tiny, with a mean diameter of about 22.2 km. But it's more than 7 times as massive than the second moon, Deimos, whose mean diameter is about 12.4 km. We're speaking in terms of a mean diameter because both moons are oblong in shape. In contrast, Earth's moon is nearly round. And it's much larger, 3,475 km in diameter.

Scientists got the first good look at Phobos in 1971 and 1972, during Mariner 9's mission to the planet. They discovered a large crater that later received the name Stickney Crater, after **Chloe Angeline Stickney Hall**, wife of Phobos' discoverer.

Today, many space scientists believe that the long, shallow grooves lining the surface of Phobos are early signs of the structural failure in the moon. It's possible that – some 50 million years from now – Phobos will break apart, becoming a ring for Mars.



Artist's concept of a ring around the planet Mars, made when Mars' moon Photos loses its structural integrity, as many scientists believe it eventually will.

In 2017, a new theory by Purdue University scientists suggested that Mars' moon Phobos might not only break apart, and form a ring around the red planet, but also that this ring formation has happened before. **David Minton**, a professor at Purdue University, and **Andrew Hesselbrock**, a doctoral student at Purdue, developed a model suggesting that debris that was pushed into space from an asteroid or other body slamming into Mars – some 4.3 billion years ago – now alternates between becoming a planetary ring and clumping up to form the moon Phobos. A theory exists that Mars' large North Polar Basin or Borealis Basin, which covers about 40 percent of the planet in its northern hemisphere, was created by that impact, sending debris into space. Hesselbrock said:

"That large impact would have blasted enough material off the surface of Mars to form a ring," .

The NASA-funded research indicates that this process of moons breaking apart into rings and then reforming as moons may have happened several times over billions of years. Hesselbrock and Minton's model suggests that as the ring formed and the debris slowly moved away from the planet and spread out, it began to clump and eventually formed a moon. Over time, Mars' gravitational pull would have pulled that moon toward the planet until it reached the Roche limit, the distance within which the planet's tidal forces will break apart a celestial body that is held together only by gravity. Phobos is getting closer to that limit. According to the model, Phobos will break apart upon reaching the Roche limit and become a set of rings in roughly 70 million years. Depending on where the Roche limit is, Minton and Hesselbrock believe this cycle may have repeated between three and seven times over billions of years.

Each time a moon broke apart and reformed from the resulting ring, its successor moon would be five times smaller than the last, according to the model, and debris would have rained down on the planet, possibly explaining enigmatic sedimentary deposits found near Mars' equator.

AK, with EarthSky and Wikipedia Notes