All About Future, Hypothetical and Possible Planets

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Future and Hypothetical Planets

Fifth planet (hypothetical)

In the history of astronomy, a handful of solar system bodies have been counted as the **fifth planet** from the sun. Under the present definition of a planet, this celestial body is Jupiter.

Previous fifth planets

There are three main ideas regarding hypothetical planets between Mars and Jupiter.

Asteroids

During the early 19th century, as asteroids were discovered, they were considered planets. Jupiter became the sixth planet with the discovery of Ceres in 1801. Soon, three more asteroids, Pallas (1802), Juno (1804), and Vesta (1807) were discovered. They were counted as separate planets, despite the fact that they shared an orbit as defined by the Titius-Bode law. Between 1845 and 1851, eleven additional asteroids were discovered and Jupiter had become the twentieth planet. At this point, astronomers began to classify asteroids as **minor planets**. Following the reclassification of the asteroids in their own group, Jupiter became the fifth planet once again. With the redefinition of the term planet in 2006, Ceres is now considered a dwarf planet.

The Disruption Theory

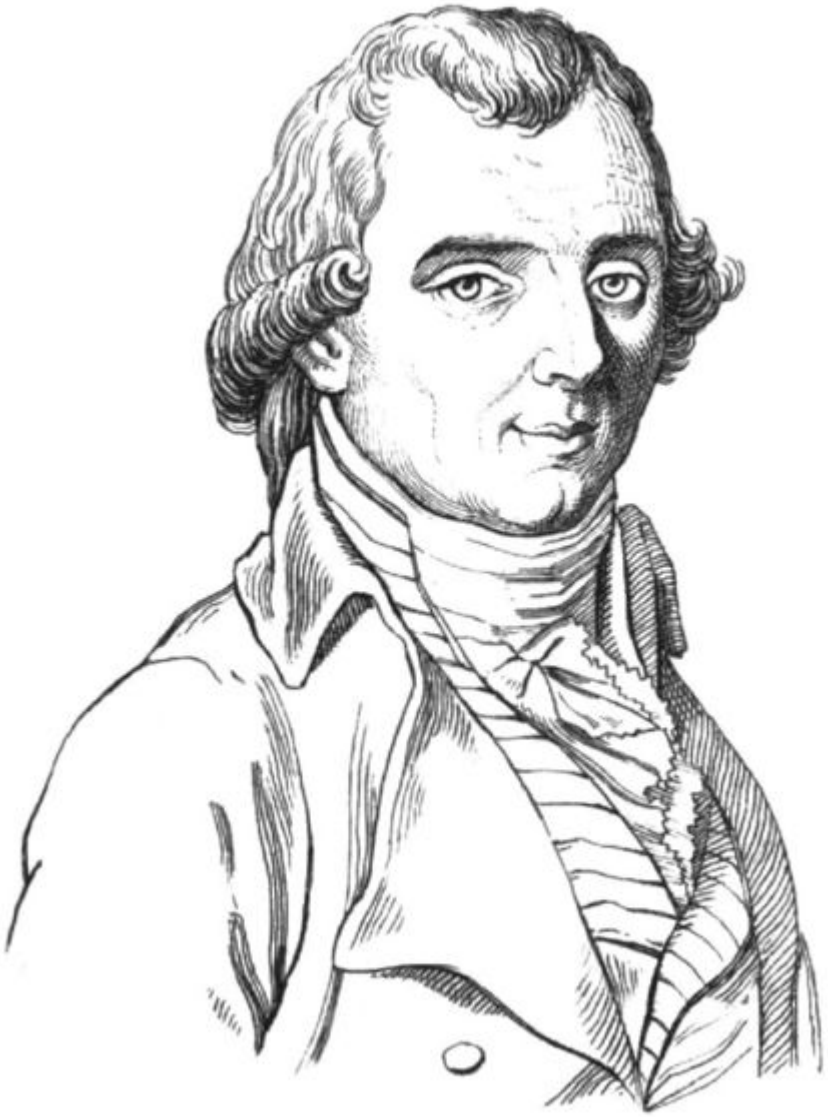
A hypothetical planet between Mars and Jupiter has long been thought to have occupied the space where the asteroid belt is currently located. Scientists in the 18th century dubbed this hypothetical planet Phaeton. Today the Phaeton hypothesis, superseded by the accretion model, has been discarded by the scientific community; however, some fringe scientists regard this theory as credible and even likely.

The Planet V Theory

Based on simulations, NASA space scientists John Chambers and Jack Lissauer have proposed the existence of a planet between Mars and the asteroid belt, going in a

successively eccentric and unstable orbit, 4 billion years ago. They connect this planet, which they name **Planet V**, and its disappearance with the Late Heavy Bombardment episode of the Hadean era. Chambers and Lissauer also claim this **Planet V** most probably ended up crashing into the Sun. Unlike the Disruption Theory's fifth planet, "Planet V" is not credited with creating the asteroid belt.

Phaeton (hypothetical planet)



Heinrich Wilhelm Matthäus Olbers, who formulated the planet Phaeton hypothesis

Phaeton (or **Phaëton**, less often **Phaethon**) is the name of a hypothetical planet posited to once have existed between the orbits of Mars and Jupiter whose destruction supposedly led to the formation of the asteroid belt. The hypothetical planet was named for Phaëton, the son of the sun god Helios in Greek mythology, who attempted to drive his father's solar chariot for a day with disastrous results and was ultimately destroyed by Zeus.

The asteroid 3200 Phaethon, sometimes incorrectly spelled Phaeton, shares Phaeton's name. 3200 Phaethon is a Mercury-, Venus-, and Mars- orbit crossing Apollo asteroid with unusual properties.

The Phaeton hypothesis

According to the now-discredited Titius–Bode law, a planet was believed to exist between Mars and Jupiter. Johann Elert Bode himself urged a search for the fifth planet. When Ceres, the largest of the asteroids in the asteroid belt (now considered a dwarf planet), was found in 1801 at the predicted position of the fifth planet, many believed it was the missing planet. However, in 1802 astronomer Heinrich Wilhelm Matthäus Olbers discovered and named another object in the same general orbit as Ceres, the asteroid Pallas.

Olbers proposed that these new discoveries were the fragments of a disrupted planet that had formerly revolved around the sun. He also predicted that more of these pieces would be found. The discovery of the asteroid Juno by Karl Ludwig Harding and Vesta by Olbers buttressed the Olbers hypothesis.

Theories regarding the formation of the asteroid belt from the destruction of a hypothetical fifth planet are today collectively referred to as the "disruption theory". This theory states that there was once a major planetary member of the solar system circulating in the present gap between Mars and Jupiter, which was variously destroyed when:

- it veered too close to Jupiter and was torn apart by the gas giant's powerful gravity.
- it was struck by another large celestial body.
- it was destroyed by a hypothetical brown dwarf, the companion star to the Sun known as Nemesis.
- it was shattered by some internal catastrophe.

In the twentieth century, Russian meteoriticist Yevgeny Leonidovich Krinov (involved in the investigation of the Tunguska event), suggested that the exploded planet in the Olbers theory be named Phaeton after the story in Greek myth.

Planet Phaeton today

Today, the Phaeton hypothesis has been superseded by the accretion model. Most astronomers today believe that the asteroids in the main belt are remnants of the protoplanetary disk, and in this region the incorporation of protoplanetary remnants into the planets was prevented by large gravitational perturbations induced by Jupiter during the formative period of the solar system.

The hypothesis continues to be advocated by some non-scientists. One notable proponent is Zecharia Sitchin, who has proposed, based on his reading of ancient Sumerian mythology, that the planet known to the Sumerians as Tiamat was destroyed by a rogue planet known as Nibiru. However, his work is widely regarded as pseudoscience.

In 1988, Donald W. Patten wrote a book entitled *Catastrophism and the Old Testament* outlining the theory that a planet he called Astra overtook Mars and, upon reaching the Roche limit, broke apart much like the comet Shoemaker-Levy 9 did when it reached Jupiter's Roche limit in 1994.

In UFO and channelling related sources, Phaeton is also known as "Maldek".

Planet V

Planet V is a hypothetical fifth planet hypothesized by NASA scientists John Chambers and Jack Lissauer to have once existed between Mars and the asteroid belt, based on computer simulations. Chambers and Lissauer presented this idea during the 33rd Lunar and Planetary Science Conference, held from March 11 through 15, 2002.

Chambers and Lissauer proposed that a previously unknown terrestrial planet once existed in an eccentric and unstable orbit around the Sun, at least 4 Ga (four billion years) ago. They connect this planet, which they name **Planet V**, and its disappearance with the Late Heavy Bombardment episode of the Hadean era.

"The extra planet formed on a low-eccentricity orbit that was long-lived, but unstable," Chambers reported. About 3.9 billion years ago, Planet V was perturbed by gravitational interactions with the other inner planets. It was tossed onto a highly eccentric orbit that crossed the inner asteroid belt, a reservoir of material much larger than it is today. It spun through the inner belt of asteroids, causing them to fly into Mars-crossing orbits. This temporarily enhanced the population of bodies on Earth-crossing orbits, and also increased the lunar impact rate.

According to Chambers, Planet V is thought to have been destroyed when it plunged into the Sun.

Vulcan (hypothetical planet)

Vulcan was a small planet proposed to exist in an orbit between Mercury and the Sun. In an attempt to explain peculiarities of Mercury's orbit, in the 19th-century French mathematician Urbain Jean Joseph Le Verrier hypothesized that they were the result of

another planet, which he named *Vulcan*. No such planet was ever found, and Mercury's orbit has now been explained by Albert Einstein's theory of general relativity. The name was later given to the home planet of the *Star Trek* character Spock when the series was created in the 1960s.

Argument for Vulcan's existence

In 1840, François Arago, the director of the Paris Observatory, suggested to the French mathematician Urbain Jean Joseph Le Verrier that he work on the topic of the planet Mercury's orbital motion around the Sun. The goal of this study was to construct a model based on Sir Isaac Newton's laws of motion and gravitation. By 1843, Le Verrier published his provisional theory on the subject, which would be tested during a transit of Mercury across the face of the Sun in 1843. As it turned out, there was not a close match between Le Verrier's theory and the observations.

Le Verrier renewed his work and, in 1859, published a more thorough study of Mercury's motion. This was based on a series of meridian observations of the planet as well as 14 transits. The rigor of this study meant that any differences from observation would be caused by some unknown factor. Indeed, there still remained some discrepancy. During Mercury's orbit, its perihelion advances by a small amount each orbit, technically called perihelion precession. The phenomenon is predicted by classical mechanics, but the observed value differed from the predicted value by the small amount of 43 arcseconds per century.

Le Verrier postulated that the excess precession could be explained by the presence of a small planet inside the orbit of Mercury, and he proposed the name "Vulcan" for this object. In Roman mythology, Vulcan was the god of beneficial and hindering fire, including the fire of volcanoes, making it an apt name for a planet so close to the Sun. Le Verrier's recent success in discovering the planet Neptune using the same techniques lent veracity to his claim, and astronomers around the world attempted to observe a new planet there, but nothing was ever found.

The search for Vulcan

In December 1859, Le Verrier received a letter from a French physician and amateur astronomer called Edmond Modeste Lescarbault, who claimed to have seen a transit of the hypothetical planet earlier in the year. Le Verrier took the train to the village of Orgères-en-Beauce, some 70 kilometres southwest of Paris, where Lescarbault had built himself a small observatory. Le Verrier arrived unannounced and proceeded to interrogate the man.

Lescarbault described in detail how, on 26 March 1859, he noticed a small black dot on the face of the Sun, which he was studying with his modest 3.75 inches (95 mm) refractor. Thinking it to be a sunspot, Lescarbault was not at first surprised, but after some time had passed he realized that it was moving. Having observed the transit of

Mercury in 1845, he guessed that what he was observing was another transit, but of a previously undiscovered body. He took some hasty measurements of its position and direction of motion, and using an old clock and a pendulum with which he took his patients' pulses, he estimated the duration of the transit at 1 hour, 17 minutes and 9 seconds.

Le Verrier thought he was satisfied that Lescarbault had seen the transit of a previously unknown planet. On 2 January 1860 he announced the discovery of Vulcan to a meeting of the Académie des Sciences in Paris. Lescarbault, for his part, was awarded the Légion d'honneur and invited to appear before numerous learned societies.

Not everyone accepted the veracity of Lescarbault's "discovery", however. An eminent French astronomer, Emmanuel Liais, who was working for the Brazilian government in Rio de Janeiro in 1859, claimed to have been studying the surface of the Sun with a telescope twice as powerful as Lescarbault's at the very moment that Lescarbault said he observed his mysterious transit. Liais, therefore, was "in a condition to deny, in the most positive manner, the passage of a planet over the sun at the time indicated" (*Popular Science*, Volume 13, pages 732-735, 1878).

Based on Lescarbault's "transit", Le Verrier computed Vulcan's orbit: it supposedly revolved about the Sun in a nearly circular orbit at a distance of 21 million kilometres, or 0.14 astronomical units. The period of revolution was 19 days and 17 hours, and the orbit was inclined to the ecliptic by 12 degrees and 10 minutes (an incredible degree of precision). As seen from the Earth, Vulcan's greatest elongation from the Sun was 8 degrees.

Numerous reports — all of them unreliable — began to reach Le Verrier from other amateurs who claimed to have seen unexplained transits. Some of these reports referred to observations made many years earlier, and many could not be properly dated. Nevertheless, Le Verrier continued to tinker with Vulcan's orbital parameters as each new reported sighting reached him. He frequently announced dates of future Vulcan transits, and when these failed to materialize, he tinkered with the parameters some more.

Among the earlier alleged observers of Vulcan, the following are the most noteworthy (*Astronomical Register*, 1869):

- Gruithuisen, on 26 June 1819, reported seeing "two small spots … on the Sun, round, black and unequal in size"
- Pastorff, on 23 October 1822, 24 and 25 July 1823, six times in 1834, on 18 October 1836, 1 November 1836 and on 16 February 1837, also claimed to have seen two spots; the larger was 3 arcseconds across, and the smaller 1.25 arcseconds.

Shortly after eight o'clock on the morning of 29 January 1860, F A R Russell and three other people saw an alleged transit of an intra-Mercurial planet from London (*Nature*, 5 October 1876). An American observer, Richard Covington, many years later claimed to

have seen a well-defined black spot progress across the Sun's disk around 1860, when he was stationed in Washington Territory (*Scientific American*, 25 November 1876).

No "observations" of Vulcan were made in 1861. Then, on the morning of 22 March 1862, between eight and nine o'clock Greenwich Time, another amateur astronomer, a Mr Lummis of Manchester, England, saw a transit. His colleague whom he alerted also saw the event. Based on these two men's reports, two French astronomers, Benjamin Valz and Rodolphe Radau, independently calculated the object's supposed orbital period, with Valz deriving a figure of 17 days and 13 hours, and Radau a figure of 19 days and 22 hours.

On 8 May 1865 another French astronomer, Aristide Coumbrary observed an unexpected transit from Constantinople, Turkey.

Between 1866 and 1878 no reliable observations of the hypothetical planet were made. Then, during the total solar eclipse of 29 July 1878, two experienced astronomers, Professor James Craig Watson, the director of the Ann Arbor Observatory in Michigan, and Lewis Swift, an amateur from Rochester, New York, both claimed to have seen a Vulcan-type planet close to the Sun. Watson, observing from Separation, Wyoming, placed the planet about 2.5 degrees southwest of the Sun, and estimated its magnitude at 4.5. Swift, who was observing the eclipse from a location near Denver, Colorado, saw what he took to be an intra-mercurial planet about 3 degrees southwest of the Sun. He estimated its brightness to be the same as that of Theta Cancri, a fifth-magnitude star which was also visible during totality, about six or seven minutes from the "planet". Theta Cancri and the planet were very nearly in line with the centre of the Sun.

Watson and Swift had the reputation as excellent observers. Watson had already discovered more than twenty asteroids, while Swift had several comets named after him. Both described the colour of their hypothetical intra-mercurial planet as "red". Watson reported that it had a definite disk – unlike stars, which appear in telescopes as mere points of light – and that its phase indicated that it was approaching superior conjunction.

These are merely the more "reliable observations" of alleged intra-Mercurial planets. For half a century or more, many other observers tried to find the hypothetical Vulcan. Many false alarms were triggered by round sunspots that closely resembled planets in transit. During solar eclipses, stars close to the Sun were mistaken for planets. At one point, to reconcile different observations, at least two intra-mercurial planets were postulated.

Search conclusion

In 1877 Le Verrier died, convinced to the end of having discovered another planet. With the loss of its principal proponent, however, the search for Vulcan abated. After many years of searching, astronomers were seriously doubting the planet's existence.

In 1915 Einstein's theory of relativity, an entirely different approach to understanding gravity than classical mechanics, solved the problem. His equations predicted exactly the