

Solar System Maps

Map making, or cartography, has been part of human evolution for longer than the written word. The earliest maps made by Man appear to have been star maps. Cave paintings dating back to 16 500 BC in Lascaux in central Spain contain patterns of dots, believed to be stars in the night sky, and also the oldest known lunar calendar.

Stars and planets were not distinguished until after the Sumerians (3 500 – 3 100 BC) had invented a writing system and a measuring system for angles. This allowed them, and more particularly the Babylonians in the 8th and 7th centuries BC, to record the positions of stars throughout the year. Those that 'wandered' about were called planets.

So Man knew six major planets early in the history of astronomy. These planets are Mercury, Mars, Earth, Venus, Jupiter and Saturn. What could not be agreed was how these planets moved.

The earliest idea, supported by most Babylonians and Greeks, was that the Earth was at the centre of the universe, orbited by the planets and the Sun, a system known as geocentric. Astronomy in this era was a part of mathematics. These skills were put to use with data for eclipses and the lunar cycle as well as observations of comets, stars and planets to produce an empirical approach. Diagrams to support their geocentric model were drawn in their libraries of scrolls.

The Chaldean astronomer Seleucus (born 190 BC) and the Greek astronomer Eratosthenes (born 276 BC) were known supporters of a heliocentric model, placing the Sun at the centre of the universe. Eratosthenes was a brilliant mathematician who measured the circumference of the Earth using geometric principles to great accuracy.

It was not until a Polish priest, Nicolaus Copernicus (born 1473), found that he had very little church work to do and began reading Greek records and making his own astronomical observations that the heliocentric model began to gain credibility. His theory was published just before he died in 1543.

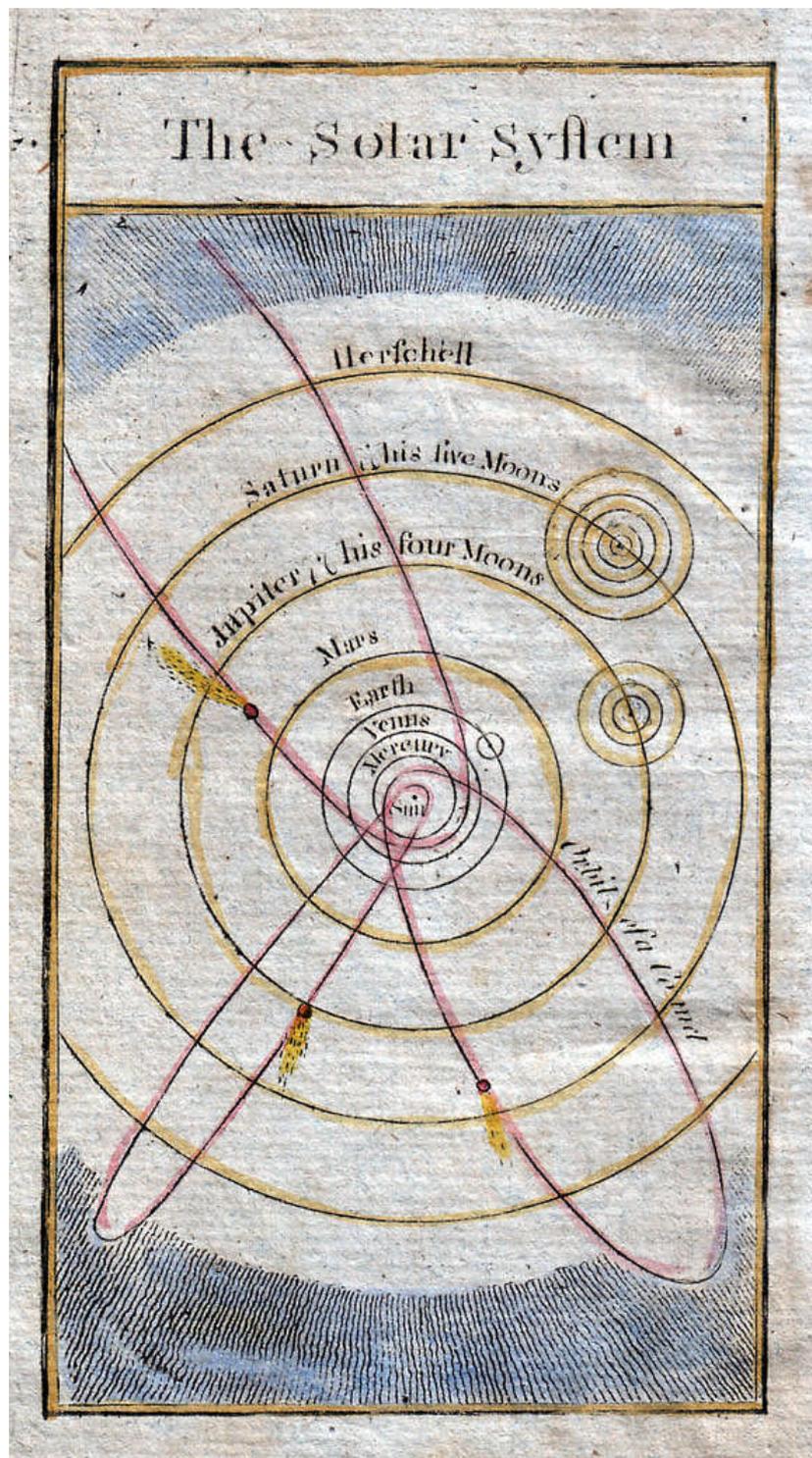
The invention of a practical refracting telescope by Galileo Galilei (born 1564) in 1609 led to the discovery of satellites, or moons. It was Galileo who discovered the four major moons of Jupiter.

Isaac Newton's (born 1643) work on gravitation finally confirmed the heliocentric model of the solar system.

While Galileo and Newton produced scientific papers, their ideas were not available to a wider audience. It took the development of moveable type for printing by Gutenberg in Germany in 1439 to start the European age of printing. The first atlases were produced around 1600, combining typeface and engravings.

In 1620 Francis Bacon suggested the production of a compilation of all knowledge based on scientific foundations. The prototype of modern encyclopaedias is generally thought to be Chambers' *Cyclopaedia* (1728). The first edition of the Encyclopaedia Britannica was published in parts over a three-year period, beginning in 1768.

The earliest solar system chart that I have come across was published in 1791.



The solar system 1791, by Jedidiah Morse

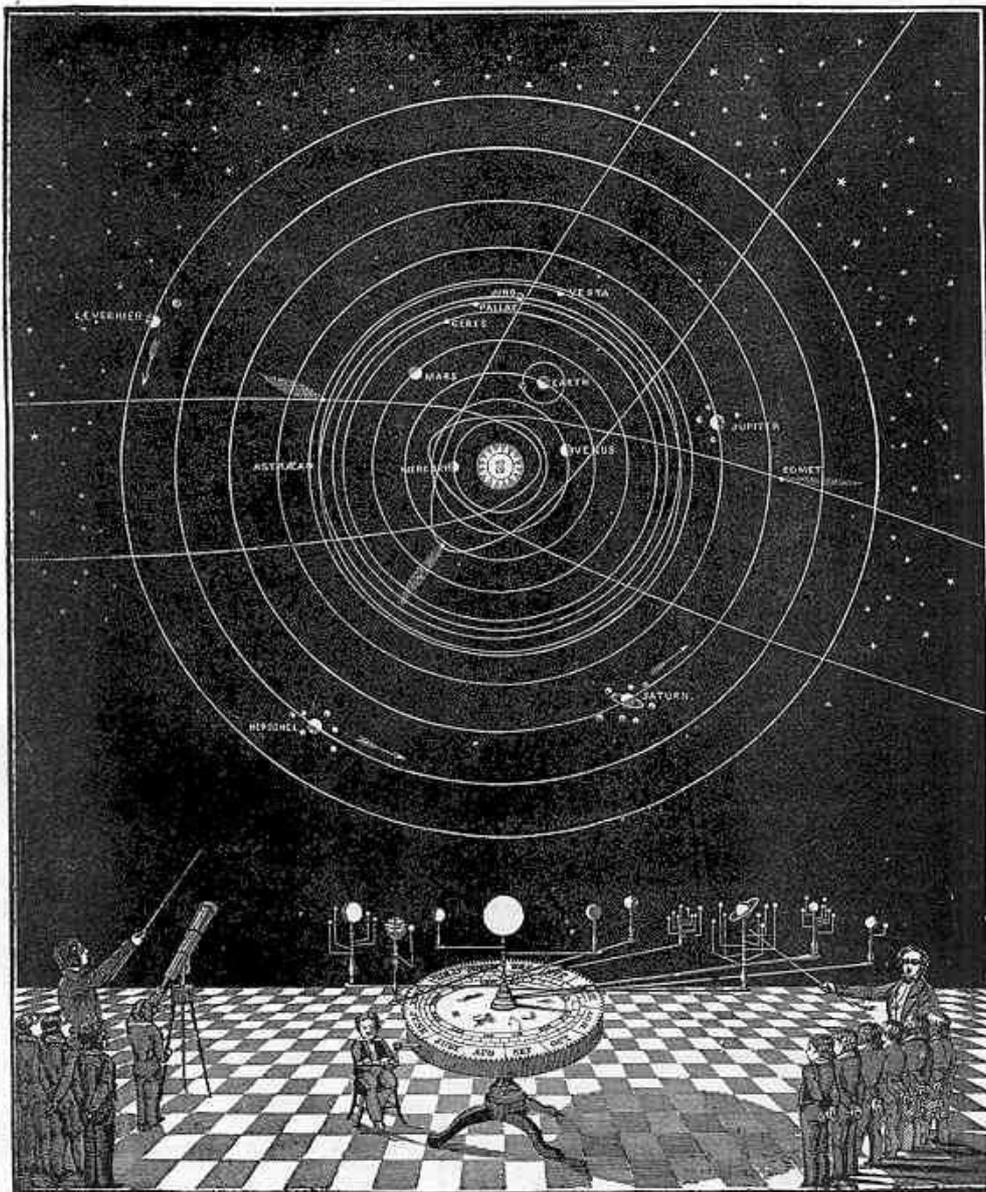
This map or chart contains the planet 'Herschell', discovered by William Herschel in 1781 and later named Uranus after the father of the Roman god Saturn. It had been observed as early as 1690, but was thought to be a star. Herschel accidentally discovered that it was actually a planet.

It also shows the four Galilean moons of Jupiter and five moons of Saturn. The orbits of three (unnamed) comets are also shown.

Jedidiah Morse (born 1761) was an American clergyman, geographer and teacher. He was the father of Samuel Morse. He made an important impact on teaching in the United States by publishing a geography textbook, *Geography Made Easy* in 1784. This was followed by *American Geography* in 1789. New editions of his school textbooks came out annually, earning him the title 'father of American geography'.

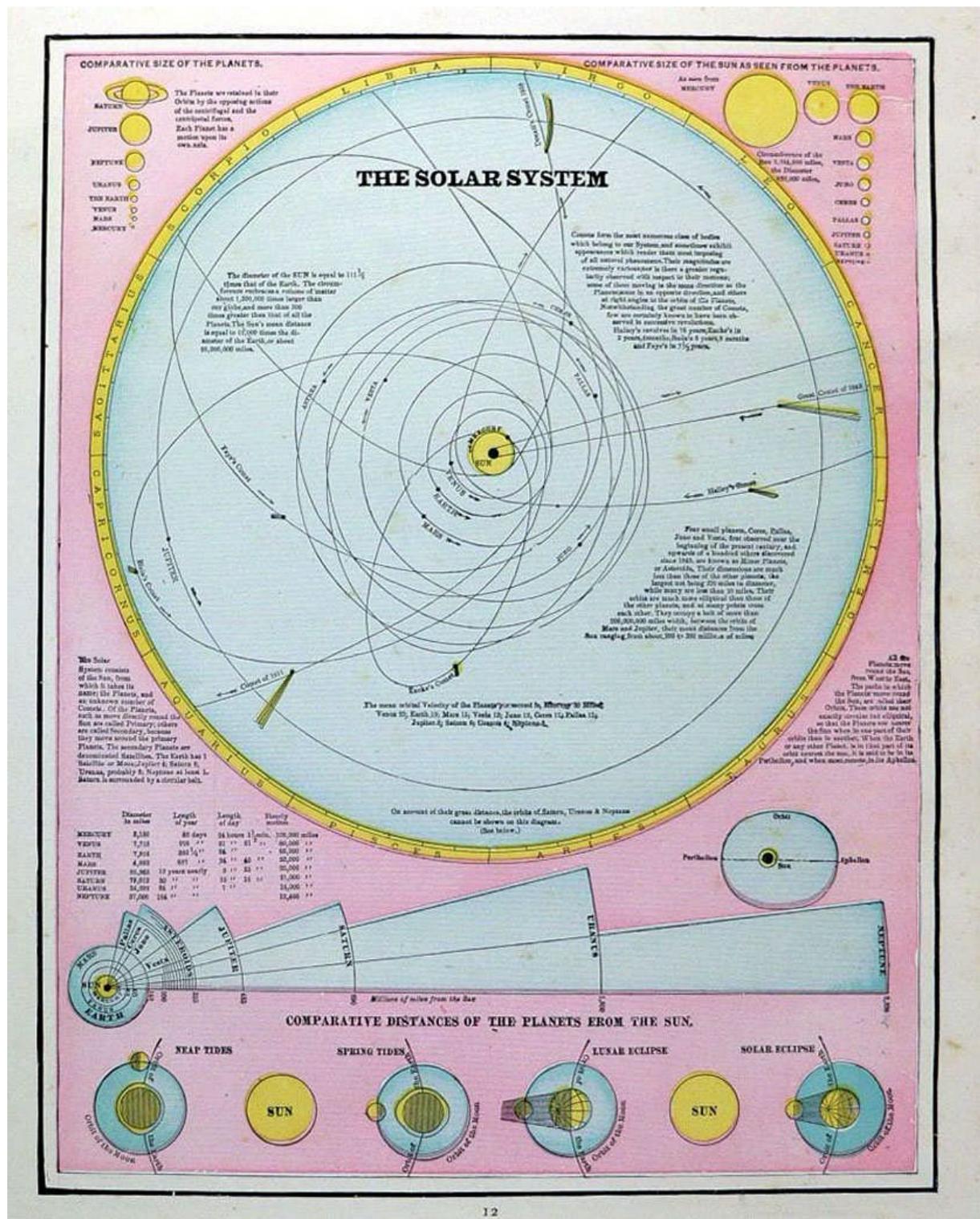
All the examples I have collected are from American schoolbooks or atlases. Smith's *Illustrated Astronomy* was used in American public or common schools. Asa Smith, the Principal of Public School Number 12 in the southern district of New York in 1848, produced it. The map shown was drawn as a frontispiece. It shows the planets of Uranus and Neptune, but under the names of their discoverers, Herschel and Le Verrier. However, both names are used in the table of contents, printed on the reverse of the map.

John Couch Adams (born 1819) is usually credited with the discovery of the planet Neptune. Adams had predicted the existence of a large planet beyond the orbit of Uranus in 1843. Urbain Le Verrier and Johann Galle observed it in 1846.



The Solar System and Orrery from Smith's *Illustrated Astronomy* 1848

The next example of a solar system map is from *The People's Atlas* published in 1891.



The Solar System from the People's Atlas 1891

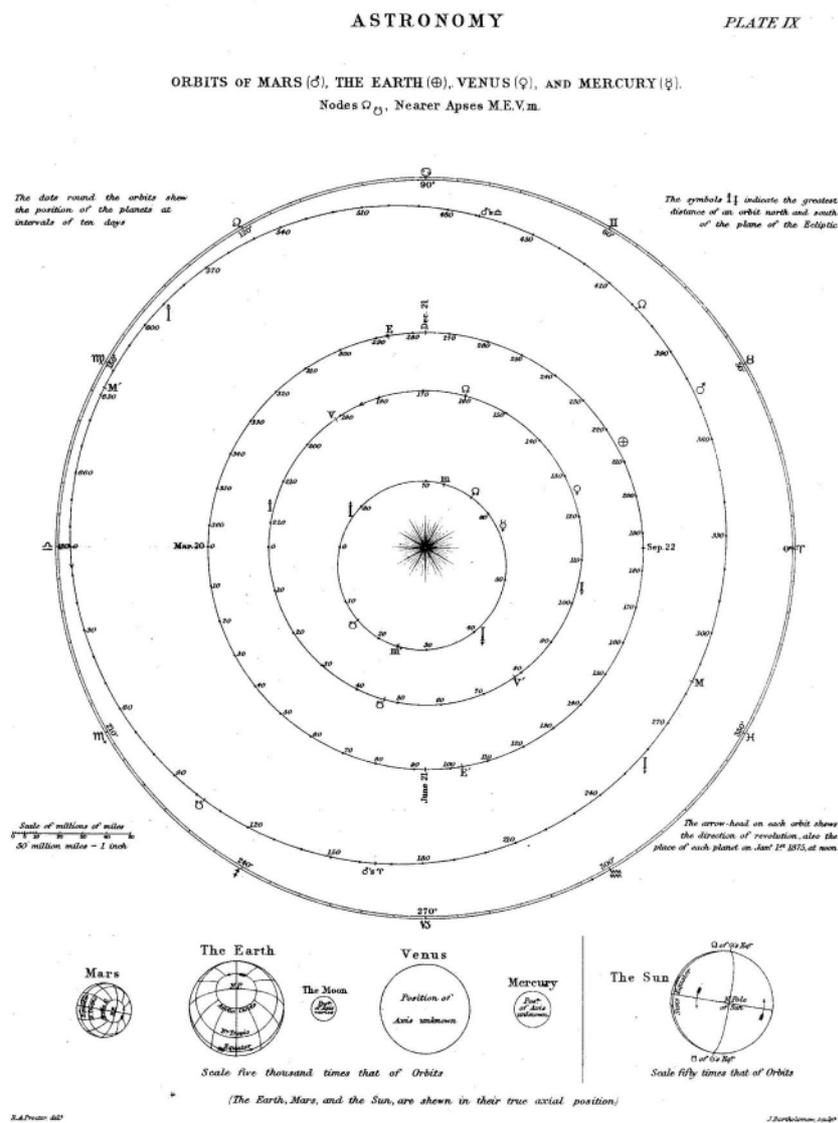
While the top diagram does not include Uranus and Neptune, these two planets are shown in the comparative distances from the Sun underneath.

Several named comets are also shown: Halley, Encke, Biela, Faye and Donati.

Also included on both the 1848 Smith map and the 1891 People's Atlas map are some of the larger asteroids: Ceres, Pallas, Astrea, Vesta and Juno. Like Pluto, these were once regarded as planets until their small size had them reclassified as asteroids or minor planets and a numbering system for classification was introduced.

The first asteroid to be discovered was Ceres. The Italian monk Giuseppe Piazzi saw it for a short time in 1801 before it was obscured by the Sun. Heinrich Wilhelm Obers discovered the second asteroid, 2 Pallas in 1802 and the fourth, 4 Vesta, in 1807. 3 Juno was discovered in 1804 by Karl Harding. Karl Ludwig Hencke discovered 5 Astrea in 1845 and 6 Hebe in 1847, although this latter asteroid is not included on the Solar System maps.

The next two examples are from J.Bartholamew's atlas published in 1892. They show the orbits of the inner planets (Plate 1X) and the outer planets (Plate X). The ticks on the inner planets' orbits are for every ten days. The ticks on the outer planets' orbits are for every thousand days.

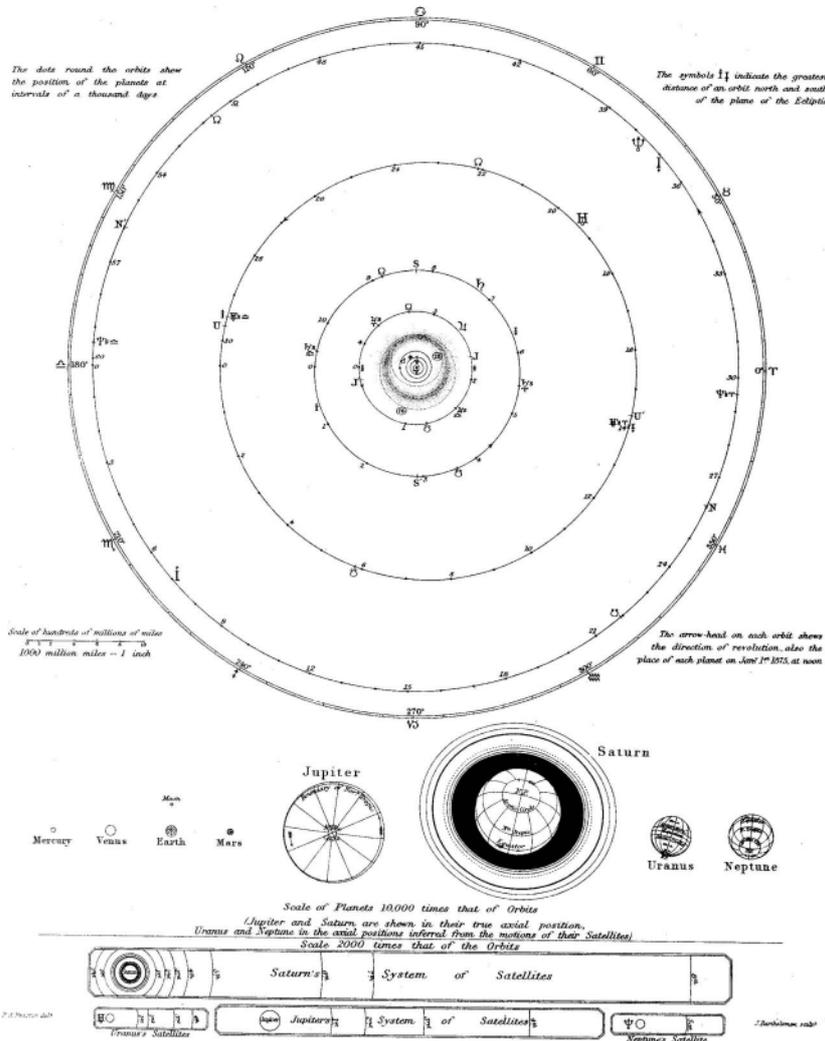


The inner planets of the Solar System 1892

ASTRONOMY

PLATE X

ORBITS OF NEPTUNE (Ψ), URANUS (Ω), SATURN (♄) AND JUPITER (♃).
 (Zone of Asteroids, and orbits of 96, 95, 9, 9, and 9). Nôdes Ω, Ω', Nearer Apes N.U.S.J.



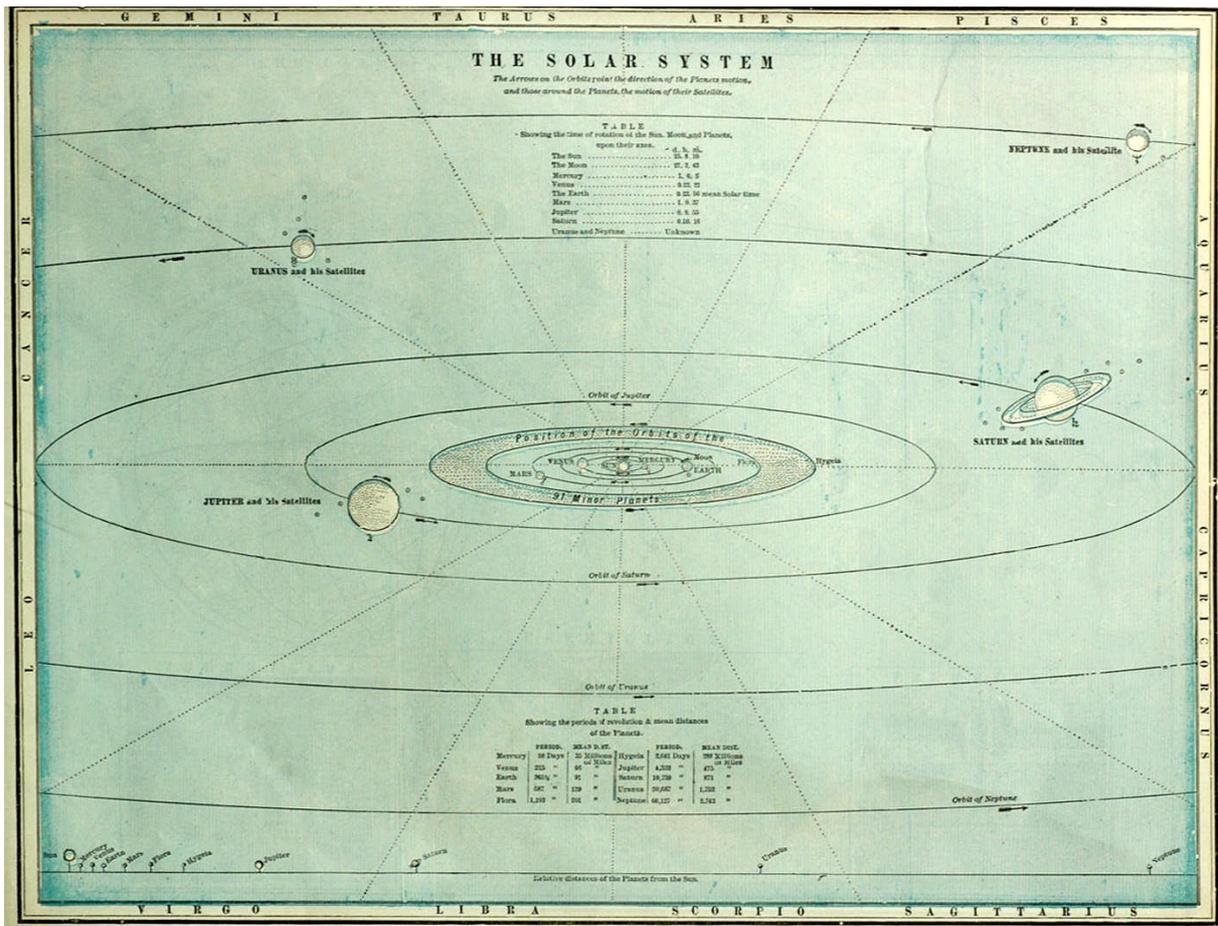
The outer planets of the Solar System 1892

Another Solar System map comes from Cram's *Universal Atlas*, published in 1899. The diagram shows all eight of the planets of the solar system.

By this time 91 asteroids had been discovered. They are shown as a belt between the orbits of Mars and Jupiter.

It does not show Pluto, which was considered to be a planet up until 2006. Pluto was discovered in 1930 by Clive Tombaugh when searching for a predicted planet beyond the orbit of Neptune. It was named after the Roman god of the underworld.

The diagram also includes the orbits of 91 minor planets and shows satellites around Uranus and Neptune.



The Solar System from Cram's Universal Atlas 1899