



LEARN - Were the first asteroids discovered by chance?

Learning Objective:

Learn about the circumstances of the first asteroids discovery and what “Celestial Police” had to do with it.

Overview:

When a group of passionate astronomers inspired by a popularised mathematical hypothesis went on a coordinated search for a new planet, they didn't expect that it would lead to the discovery of asteroids.

Specifics:

Today we know that most asteroids are found between Mars and Jupiter. Why did this specific region of the solar system attract so much astronomers' attention at the time of the first asteroids discovery?

In the 18th century, German astronomer Johann Daniel Tietz, better known by his Latinised surname Titius proposed a hypothesis explaining the distances between the planets in the solar system.

He used the concept of [geometric progression](#) to calculate the radii of the planets' orbits around the Sun.

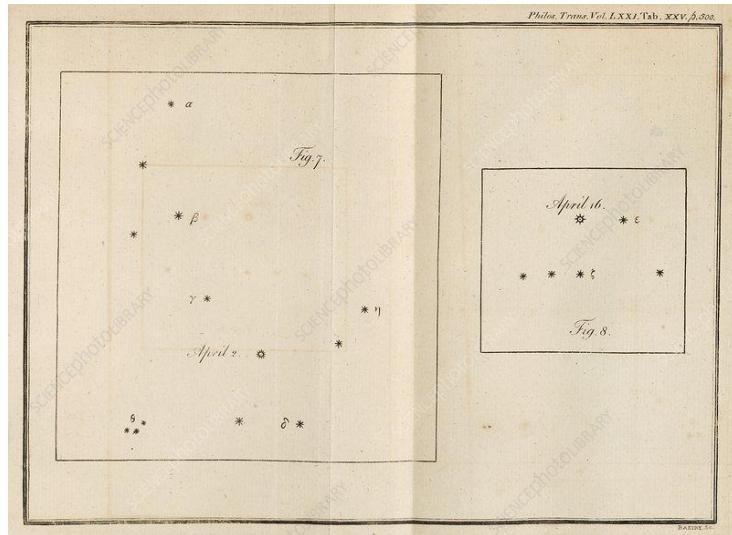
Titius was convinced that there was no chaos or randomness in the universe, but rather an order and regularity that could be explained through mathematics and geometry. This idea was rooted in the Pythagorean school and influenced astronomers over time.

In 1766, Titius translated the work of the Genovese naturalist and writer Charles Bonnet. The German astronomer added some explanations of geometric progression to complement Bonnet's passages on the number of planets that make up the solar system.

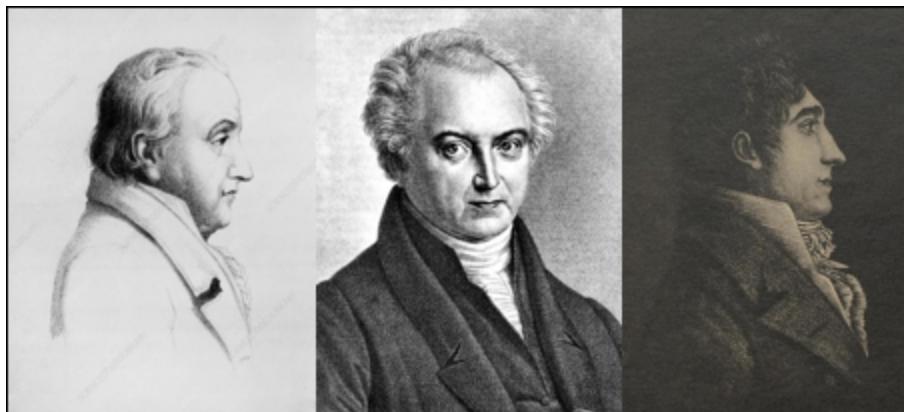
In 1772, Titius' version was popularised by his fellow astronomer Johann Elert Bode. Thanks to this popularisation, it became known as the Titius-Bode Law.



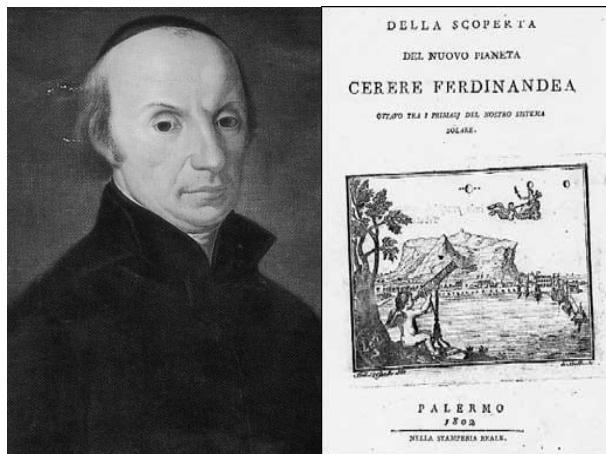
It was not widely accepted in the scientific community because of the need for evidence, such as the location of planets beyond Saturn (the last known planet at that time) and another planet between Mars and Jupiter. Then, less than a decade later, German-British astronomer William Herschel announced the discovery of Uranus where this law predicted a planet should be.



This discovery had an enormous impact and people began to treat the Titius-Bode Law more seriously. One of the consequences was the creation of an informal group of more than 20 astronomers from different countries whose objective was to discover a planet that the Titius-Bode Law predicted to be between the planets Mars and Jupiter. This group became known as the "Celestial Police".



One of its members was an Italian priest and astronomer Giuseppe Piazzi. Prior to joining the group he had spotted something new in the sky. At first, Piazzi thought it was a star and then a comet, but he also assumed that this new object could be something else. For some time this object remained unseen because of being angularly close to the Sun. Later the object mentioned by Piazzi was observed again by other astronomers. Calculations of its distance indicated that this new object was located where the Titius-Bode Law predicted. Considered then as a new planet, it was named Ceres Ferdinandea and later simplified to Ceres.



The Celestial Police became famous, especially when its members discovered three new objects – Pallas, Juno and Vesta. However, when calculating their distances from the Sun, it was concluded that they were similar to Ceres. Later when new objects of smaller sizes than classical planets were discovered at similar distances, astronomers concluded that they could be fragments of an ancient planet destroyed by a collision.

The visual characteristics of these newly discovered objects contributed to the creation of the term “asteroid” (a Greek word meaning “starlike”) in the 19th century and, later, “asteroid belt” after the discovery of many other similar objects. The discovery of this belt led to the Titius-Bode Law discredit. This law fell entirely out of favour when Neptune and, much later, Pluto were discovered in very different locations than predicted.

Celestial body	Distance from the Sun	Observed (au)
	Titius-Bode law	
Mercury	0.4	0.39
Venus	0.7	0.72
Earth	1.0	1.00
Mars	1.6	1.52
Ceres/Asteroids	2.8	2.77
Jupiter	5.2	5.20
Saturn	10.0	9.54
Uranus	19.6	19.2
Neptune	38.8	30.06

However, it cannot be denied that this mathematical proposal, favoured by a series of coincidences, contributed to the advancement of astronomy and opened the way for a better understanding of the solar system and the search for hitherto unknown objects.

Learn more about this subject:

[The discovery of asteroids \(European Space Agency\)](#)

[Discovering asteroid Vesta: the story of the Celestial Police \(Sky at Night Magazine\)](#)

[The first asteroid ever discovered \(Carrie Nugent/TED-Ed - video\)](#)

[Why Are There No Planets in the Asteroid Belt? \(American Museum of Natural History - video\)](#)