

History and Discovery of Asteroids

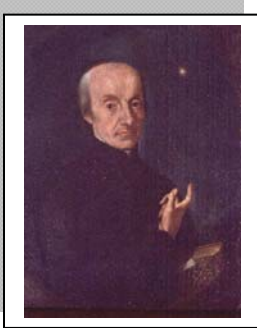
It Was a Dark and Starry Night

FLASHBACK—EARLY ASTEROID DISCOVERIES

It was a dark and starry night on New Year's Day, 1801, and **Giuseppe Piazzi**, an Italian monk, was at work in his observatory on the island of Sicily. He was a member of the **Celestial Police**¹, a group of astronomers looking for the missing planet that Kepler² had predicted between Jupiter and Mars. That night he was

Early astronomers like Piazzi...

- kept accurate records
- made observations
- verified others' work
- communicated with colleagues



Giuseppe Piazzi pointing at Ceres

verifying and cataloging the known stars in the Taurus constellation. While checking other astronomers' work, he saw a tiny point of light close by. At first he thought it was just a dim star that had not been included on his chart, so he checked for it the next night, but *it had moved!* He continued to note its position changes on January 3 and 4. Clearly what he was observing was not a star! He wrote to a number of his colleagues, including **Johann Bode** who was then Director of the Berlin Observatory, informing them of his findings. Bode studied his star charts.³ These handwritten maps provide a record of observations—the relative positions of the stars and the movement of the moon and planets. He was certain that Piazzi had found “the missing planet,” even though no one besides Piazzi had seen it.

And the Plot Thickens...

Cloudy weather set in and Piazzi was so sick that he couldn't make his regular observations of the skies on some January nights. By January 24, Piazzi realized what he had discovered. He wrote a friend: “I have announced the star as a comet. But the fact that the star is not accompanied by any nebulosity [*clouds of dust and gas*] and that its movement is very slow and rather uniform has caused me many times to seriously consider that perhaps it might be something better than a comet. I would be very careful, however, about making this conjecture [*this idea*] public.”

He wrote a similar letter to Bode the next day. However, Bode did not receive it until March 20, because Napoleon had invaded Italy and cut off communication routes. When the letter finally reached Bode, he studied his star maps and convinced Piazzi that he had found the “missing planet.” Piazzi named the object Ceres. Piazzi's friend, **Baron von Zach** announced the discovery in his *Monthly Correspondence* in the summer of 1801.

To establish that he really had found a new planet, Piazzi needed to be able to predict his new planet's orbit (or path) in the sky. This was necessary so that other astronomers could find the object when they wished to investigate it more thoroughly. Piazzi had observed Ceres for six weeks, but he did not have enough information to calculate the object's orbit by any mathematical methods available at that time. After that, **William Herschel** and others

Verifying discoveries is an important part of the scientific process.

¹ see “In Search of...” Activity

² see “Between Jupiter and Mars, I Place a Planet” Flashback

³ see “Patterns in the Sky” Activity

searched unsuccessfully for the object, and several astronomers attempted to work out Ceres' orbit from Piazzi's limited data, but they each came up with different results. Ceres appeared to be lost. It had passed into the evening's twilight before anyone else could verify Piazzi's observations.

Additional Resources

http://www.astropa.unipa.it/versione_inglese/Hystory/BODE'S_LAW.htm

Informative text entitled "Bode's Law and the Discovery of Ceres" written by Michael Hoskin at *Churchill College*.

<http://www.astropa.unipa.it/Asteroids2001/>

Presents a biography of Father Giuseppe Piazzi and historical information about the discovery of Ceres.

Questions relating to *It Was a Dark and Starry Night*

1. When and where did Giuseppe Piazzi live and work?
2. What was Piazzi doing when he saw a new point of light?
3. What is a star chart? What technology is available today that makes handwritten star charts unnecessary?
4. What was different about the point of light that he discovered on New Year's Night, 1801?
5. What did Johann Bode think that Piazzi had discovered?
6. How did the brightness of this point of light compare with that of other stars in the sky?
7. Why did Piazzi not think that the moving point of light he had discovered was a comet? Why was he hesitant about making his thoughts public?
8. What historical event was occurring during this time that interrupted Piazzi's communication with other astronomers?
9. Who finally announced that Piazzi had discovered the "missing planet"?
10. Why was the discovery of Ceres not substantiated during the six weeks of Piazzi's observations?
11. The telescope was invented nearly 200 years before the first asteroid discovery. How was the invention of the telescope instrumental to the work of the Celestial Police?