

Name _____
Literacy Lab #31 - Asteroid Is A Runt Planet

Date _____
Earth Science - Breed - 2012/2013

Directions: Take a few minutes to read the article below either online (or on the back of this page.) Write responses to the statements or questions below. Cut/copy/paste is not allowed – use your own words and thoughts, based in research if needed.

Read more: http://www.nytimes.com/2012/05/11/science/space/asteroid-vesta-proves-to-be-dwarf-planet.html?_r=1&ref=space

Fact-finding: List three facts that you learned in this article.

1.

2.

3.

Vocabulary: List and define three unfamiliar words in the space below.

Implications: What are your feelings about this “discovery”? Express your feelings (tactfully) about whether this is an advancement of science or a bad idea.

Observations of an Asteroid Provide Hints of How the Earth Came Together

Confirmed: Vesta, the second largest of the asteroids, is a runt planet.

Observations by [NASA's Dawn](#) spacecraft show that Vesta formed within the first few million years of the solar system, that its surface is in places as bright as snow and in others as dark as coal, and that it contains an iron core that may have even briefly generated a magnetic field — all very planetlike features.

Both Vesta and Ceres, the largest asteroid and the Dawn's next destination, are also heavy enough that gravity has made them round.

"The Dawn team finds itself calling these things planets all the time," Christopher T. Russell, the mission's principal investigator, said in an interview.

In the current parlance of astronomers, however, Vesta and Ceres, like Pluto, are dwarf planets, not planets. The definition of planet, set by the International Astronomical Union in 2006, not only takes into account size and appearance, but also requires that a planet be the gravitational bully in its orbit. While Vesta and Ceres are round, they have not vacuumed up or pushed away thousands of other rocks in similar orbits.

But that is in large part what makes Vesta intriguing. The asteroid belt between [Mars](#) and [Jupiter](#) seems to be the remnants of a planet that never came together, and a closer look at Vesta could reveal much about the planet-building process. Dust coalesced into larger chunks like Vesta, which is 330 miles wide, and these then combined to form the rocky planets: Mercury, Venus, [Earth](#) and Mars.

So far, what scientists have learned from the Dawn fits with what they thought. "Science doesn't have to go back to the drawing board right now," Dr. Russell said.

The scientists report their Vesta findings in six articles in Friday's issue of the journal *Science*.

One of the surprises is that two giant craters near the south pole of Vesta formed relatively recently: one of them a billion years ago, the other at least two billion years

ago. On other solar system bodies like the Moon, such giant impacts occurred very early in the history of the solar system, about four billion years ago. The mineralogical measurements also confirm that a class of meteorites that have been found on Earth came from Vesta, very likely ejected by the impact that created the giant craters.

Vesta's pockmarked surface could also help tell why the pieces of the asteroid belt never became a planet.

After Vesta formed, the gravity of newly formed Jupiter stopped further growth. The traditional view is that Jupiter's pull accelerated the Vesta-size asteroids so that they smashed themselves apart instead of gently coming together. Jupiter would have scattered away many of the original asteroids, but slowly.

An alternate idea, however, is that Jupiter, nudged by leftover gas and dust in the early solar system, migrated inward to where Mars orbits today, scattering away the asteroids, and later was pulled outward again by the gravity of Saturn, and in its wake pulled back some asteroids.

"Vesta is definitely super interesting for the work that we did," said Kelvin Walsh, a research scientist at the [Southwest Research Institute](#) in Boulder, Colo., whose computer simulations indicated that this could explain the current asteroid belt and why Mars is small compared with Earth and Venus. He is not a member of the Dawn team.

The 2,000 craters on Vesta cataloged by the Dawn scientists could tell the history of impacts, and if Dr. Walsh is right, there might be fewer than would be predicted by the traditional picture.

The Dawn spacecraft has been orbiting Vesta since last July. This August, it will propel itself away from Vesta and head toward Ceres, which is slightly farther out from the Sun, but of a much different makeup. While Vesta is all dense rock and metal, Ceres appears to contain large amounts of ice. That could help solve another open question of the solar system: Where did Earth's water come from?

It might have come from Ceres-like bodies that formed farther out in the solar system and then were pulled in by a migrating Jupiter, Dr. Walsh said.