**PAESTA Podcast Series -- You Asked, We Answered!**

**Episode 17 - Did Earth's Water Come From Outer Space?**

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Hello, my name is Victoria Parsons, and I am here to tell you about the origin of water on Earth. There are many different theories as to where all of the water on Earth came from, and while there is still not a definite answer, researchers are getting closer to the truth every day. The theories as to where water on Earth came from [1] include planetary cooling, extra planetary sources, hydrate minerals, volcanic activity, water within the development of Earth, and the role organisms may have played. Understanding where Earth's water came from is important when trying to understand the formation of Earth millions of years ago.

[2] The original theory surrounding the origin of Earth's water explains that the Earth was once considered to be a dry planet, meaning that water did not appear until millions of years later. However, after scientists began studying this more in depth, they changed the idea, saying that Earth was formed as a wet planet, meaning that there was enough water from the very beginning to be able to sustain life. The evidence surrounding this new theory says that meteorites brought water to Earth, stemming from the large asteroid, Vesta, which was also formed in the same region as Earth. This information also suggests that other planets may have been formed as wet planets, even if they are not anymore due to their particular atmosphere. [3] Research suggests that destructive meteorite "bombardments" ended around 3.9 billion years ago, which is when the planet formed.

With this information, [4] Earth's water is mainly suspected to have originated from comets and asteroids, which can break up into meteorites. The main difference between the two is that comets have a higher concentration of say, ingredients, that vaporize when heated, which accounts for their tails of gas. [4] Both have the possibility of containing ice, and with the amount of ingredients the two contain, they could deliver oceans worth of water. Comets, however, are believed to contain water that is different than the water present on Earth. They contain more deuterium, a heavier form of hydrogen, which is not as distinctive in Earth's water. There is evidence that states otherwise though, and [6] in 2000, the Earth was hit by a large comet, and when scientists began to study it, they agreed that it had the same hydrologic makeup as the water already present on Earth. Although, with more and more research being done, between comets and asteroids, researchers are leaning more towards asteroids as the main water source. [5] These asteroids come from the space between Mars and Jupiter. This information can also help scientists learn more about Mars, which although is a different topic, has the ability to lead to more detailed information about the "Red Planet."

Now, to switch gears to a new theory about where water on Earth originated from, another theory suggests that water has been on Earth since its initial formation, just underground, deep inside the mantle. [7] Research suggests that it was quite possible for water molecules to have clung to dust particles from the dust cloud which is believed to have condensed not only Earth, but also other planets. The water was then brought to Earth's surface through volcanic activity many, many years later. If this information is true, it could mean that other planets also have water in their physical makeup, it may just have not been brought to the surface yet. This information being true could lead to more scientific revelations about our universe. Also conflicting, is the statement that Earth's mantle today has water concentrations of only 200th of a percent.

All of this information surrounding Earth's water origin can be confusing, but it doesn't have to be. While researchers and scientists are still not in complete agreement about the origin of water on Earth, they are getting closer and closer every day to the true origin. As of now, they are leaning towards asteroids the most, but other theories, such as comets or the Earth's mantle have not been completely shot down. These theories are all important to understand, and can all be connected in one way or another. There are tons of resources available to help aid in the knowledge of this puzzling question. I truly hope this information was helpful in the comprehension of the origin of Earth's water. Thank you for listening, this is Victoria Parsons signing off now, but stay tuned until next time!

(*This audio file was recorded by Victoria Parsons on April 5, 2016.)*

**Works Cited**

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