Astrobiology News March 2015:
Journey to the Dawn of Our Solar System

This month's title may be a bit misleading. The *Dawn* spacecraft will not travel back in time, but on March 6th, it did enter orbit around the dwarf planet, Ceres, which is thought to preserve a record of the early evolution of our Solar System[1]. Ceres is the most massive world in the Asteroid Belt, a region of space located between the orbits of Mars and Jupiter that effectively separates the rocky terrestrial worlds of the inner Solar System from the gas giant and icy worlds of the outer Solar System. *Dawn* is the 1st spacecraft to visit two worlds in the Asteroid Belt; from 2011 to 2012, *Dawn* orbited Vesta, the 2nd most massive object in this region.

What makes Ceres and Vesta so interesting? They are the largest protoplanets, baby planets whose growth was interrupted by the formation of Jupiter, to remain intact since their formation. Their exploration will enable us to study the nature of the building blocks from which the terrestrial planets (like Earth) formed. Although these two are the largest worlds in the Asteroid Belt, they are quite different from each other, and as such hold important clues to the diversity of processes that were important during the first few million years of our Solar System's evolution. While Vesta is dry and rocky, Ceres, which is just a little more distant from the Sun, is an icy world with water vapor in its thin atmosphere. Data returned from *Dawn* will help scientists study the role of size and water in planetary evolution.

This summer, the *New Horizons*[2] spacecraft will visit another (very well-known!) dwarf planet, Pluto. On March 12th, *New Horizons* reached a milestone in its journey. It crossed within one astronomical unit from Pluto, meaning it is now closer to Pluto than the Earth is to the Sun. Pluto resides in the Kuiper Belt, a disc-shaped region of icy objects beyond the orbit of Neptune. Expect to hear more about *New Horizons'* nearly decade-long journey later this year!

By the way, other stars have leftover regions of rocky and icy planetesimals (planet building blocks), similar to our Asteroid and Kuiper Belts. You can help identify these `debris disks' by joining the Zooniverse's *Disk Detective*[3] project. Your classifications will enable scientists to explore fundamental questions about the environments where planets are born.

Until next month,

Grace

Grace Wolf-Chase, Ph.D. (gwolfchase@adlerplanetarium.org)

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[1] http://dawn.jpl.nasa.gov/
[2] http://pluto.jhuapl.edu/
[3] http://www.diskdetective.org