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ASTRONOMY

Planets or not, discoveries still show how solar systems form

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Headlines worldwide in July announced the discovery of the "10 th planet" in our solar system. This 2,000-odd-mile-wide iceball, temporarily named 2003 UB313, orbits the sun far beyond distant Pluto, its slightly smaller sibling.

Reports of the discovery reopened an old debate on whether Pluto is a proper planet. Astronomers have found hundreds of "Trans-Neptunian Objects" (TNOs for short) outside the orbit of Neptune since 1992. Maybe Pluto and 2003 UB313 should be called the biggest TNOs.

But this argument misses the point. What's important is not the name, but what we are learning about how solar systems — ours and others — change through time.

Our solar system consists of the sun and everything that orbits it. That includes the Earth and all the planets. If you made a scale model to fit in your house, the sun would be smaller than a pea, you'd need a magnifying glass to see the Earth, and the next nearest star (another pea) would be at your cousin's house 50 miles away.

It's one of astronomy's biggest challenges to figure out why the planets are arranged so that small, rocky worlds (Mercury, Venus, Earth and Mars) are close to the sun, and gas giants (Jupiter, Saturn, Uranus and Neptune) are farther away.

According to our best understanding, giant planets could form only in a certain range of distances from the newborn sun. Too close, and there wouldn't have been enough solid (frozen) material available; too far, and the process would be too slow.

Finding the TNOs — the leftover raw material not used up in the giant planets — confirms this picture. But not everything adds up. Neptune is far outside the prime zone for giant-planet formation. It couldn't have formed where it is now.

In the past decade, we've seen solid evidence for planets around other stars. We now know of more than 100 solar systems with planets orbiting stars like our sun.

But the first to be discovered were gasgiant planets, close to their parent stars where they couldn't have formed.

What we are beginning to understand is that planets don't always stay in their original orbits. Over millions or billions of years, they might move.

In our solar system, both Neptune and Uranus migrated outward. As they did, their gravity rearranged the leftover icy chunks, pushing some outward, scattering others into crazily tilted orbits (such as 2003 UB313), trapping still others (such as Pluto) into a complicated synchrony.

The migration of the outer planets wrote their history in the paths that the TNOs follow around the sun. Every discovery of an object such as 2003 UB313, no matter what you call it, reveals another chapter in that epic history.

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