The Kuiper Belt, filled with icy worlds

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The Kuiper Belt is a disc-shaped region beyond the orbit of Neptune. It is about 30 to 35 astronomical units (AU) from the sun. For comparison, the distance between Earth and the sun is one AU, or about 93 million miles. This distant region is probably populated with hundreds of thousands of icy bodies larger than 62 miles across, and may contain more than a trillion comets, which are smaller icy bodies.

The dwarf planet Pluto may be the best known of the larger objects in the Kuiper Belt. Comets from the Kuiper Belt take less than 200 years to orbit the sun and travel approximately along the same plane as most of the planets orbiting the sun.

Remnants 4.6 Billion Years Old

Objects in the Kuiper Belt are presumed to be remnants from the formation of the solar system about 4.6 billion years ago. Scientists think the gravity of big planets like Jupiter and Saturn swept all of these icy leftovers out to the edge of our solar system.
The first of these strange bodies, now called Kuiper Belt Objects (KBOs), was discovered in 1992. It was discovered by scientists David Jewitt and Jane Luu, who did not believe that the space beyond our inner solar system was empty.

Beginning in 1987, they scanned the heavens in search of dim objects beyond the planet Neptune. After five years looking off and on through a powerful telescope at the University of Hawaii, they finally found what they were after. It was a reddish-colored speck 144 AU from the sun -- which was even more distant from the sun than Pluto. Jewitt and Luu wanted to name their find "Smiley," but it has since been cataloged as "1992 QB1."
Comets Present A Real Puzzle

That discovery marked our first glimpse of the Kuiper Belt. In 1951, Gerard Kuiper had proposed that a belt of icy bodies might lie beyond Neptune. He figured it was the only answer to a baffling mystery about comets. Some comets loop through the solar system on regular orbits of a half-dozen years or so. They encounter the sun so often that they quickly evaporate, vanishing in only a few hundred thousand years, which is not very long compared with the age of the solar system. Astronomers call these short-lived objects "short-period comets." They evaporate so quickly that we shouldn't see any because they should have all died out by now. Astronomers see them all the time, though. It was a real puzzle.

Kuiper thought there might be a population of dark comets circling the sun in the area of Pluto. He figured that the ones beyond Neptune never stuck together, but stayed individual and nowadays occasionally fall toward the sun, becoming short-period comets.

Because KBOs are so distant, their sizes are difficult to measure. Scientists estimate the size of a KBO based on how reflective its surface is. Space telescopes have helped them to estimate the sizes of most of the largest KBOs.

Discovering Haumea And Eris

One of the most unusual KBOs is Haumea, which is a part of a collisional family orbiting the sun. Haumea apparently collided with another object that was roughly half its size. The impact blasted large, icy chunks away and sent Haumea reeling, causing it to spin end-over-end every four hours. It spins so fast that it has pulled itself into the shape of a squashed American football. Haumea and two small moons named Hi'iaka and Namaka make up the family.
In July 2005, a team of scientists announced the discovery of a KBO that was initially thought to be about 10 percent larger than Pluto. The object, later named Eris, orbits the sun about once every 560 years. It has a small moon named Dysnomia. More recent measurements show Eris to be slightly smaller than Pluto, which was then designated the ninth planet in the solar system.

The discovery of Eris forced astronomers to consider whether Eris should be classified as the 10th planet. Instead, in 2006, the International Astronomical Union created a new class of objects called dwarf planets, and placed Pluto, Eris and the asteroid Ceres into this category.

In 2015, NASA's New Horizons spacecraft flew past Pluto, making the first up-close exploration of a Kuiper Belt Object. The spacecraft is continuing deeper into this region of icy debris and might be able to explore at least one more object.

**How The Kuiper Belt Got Its Name**

The region is named for Gerard Kuiper, the astronomer who predicted its existence. It is sometimes called the Edgeworth-Kuiper Belt, recognizing an independent and earlier prediction by Kenneth Edgeworth. Objects discovered in the Kuiper Belt get their names from diverse mythologies. Eris, for example, is named for the Greek goddess of conflict and strife, and Haumea is named for a Hawaiian goddess of fertility and childbirth. Comets are generally named for the person who discovered them.
Significant Dates

1943: Astronomer Kenneth Edgeworth suggests that a reservoir of comets and larger bodies resides beyond the planets.

1951: Astronomer Gerard Kuiper predicts the existence of a belt of icy objects just beyond Neptune’s orbit.

1992: After five years of searching, astronomers David Jewitt and Jane Luu discover the first KBO.

2002: Scientists using the 48-inch Oschin telescope at Palomar Observatory find Quaoar, the first large KBO hundreds of kilometers in diameter.

2005: Astronomers announce the discovery of Eris, which they initially think is slightly larger than Pluto.

2008: The Kuiper Belt object provisionally known as 2005FY9 (“Easterbunny”) is recognized in July as a dwarf planet and named Makemake (pronounced MAHkeh-MAHkeh) after the Polynesian creation god. In September, another KBO is designated a dwarf planet and given the name Haumea.

Quiz

1 Which of the following answer choices would BEST describe Jewitt and Luu's reaction to the discovery of KBOs?
(A) They were excited about proving Kuiper's theory about comets wrong.
(B) They were hoping to find the oddly-shaped KBO, Haumea.
(C) They expected the objects to exist in the outer solar system.
(D) They were surprised to find any objects in the outer solar system.

2 Which of the following MOST influenced Kuiper's theory about the existence of the belt of comets in the outer solar system?
(A) Kuiper's observation of dark comets that followed the same orbit as Pluto
(B) astronomers' frequent observations of football-shaped comets like Haumea
(C) the mystery about why comets melt when they enter the inner solar system
(D) the unanswered question about why astronomers frequently see comets that should have melted a long time ago

3 Which statement BEST explains why the last graphic is included in the article?
(A) to contrast the placement of Kuiper Belt Objects and Eris against the inner solar system
(B) to highlight the unusual-shaped orbit of the Kuiper Belt Object Eris
(C) to draw attention to the similar orbits of Jupiter, Saturn, Uranus, and Neptune
(D) to show that Kuiper Belt Objects do not have orbits like planets and dwarf planets do

4 Which conclusion is supported in BOTH, the second graphic and the article?
(A) Kuiper Belt Objects typically have cryovolcanos.
(B) Kuiper Belt Objects have a composition similar to the earth.
(C) Kuiper Belt Objects are mostly made of ice.
(D) Kuiper Belt Objects are sometimes very large.