What's a Planet, Anyway?

by Elaine Langlois

Not so many years ago, everyone knew what a planet was. A planet was a big globe that orbited the sun and reflected its light. There were nine, and the smallest was Pluto.

But in the early 1990s, powerful new telescopes on Earth and the Hubble Space Telescope began detecting objects in the far reaches of the solar system that challenged this definition. These objects orbited the sun and were nearly as big as Pluto. Were these planets too? And what should we call planet-like objects that orbit *other* stars and others that don't orbit stars but look like planets? People began asking the question: What's a planet, anyway?

The Nine Planets

The word *planet* comes from the Greek word *planetes,* which means "wanderers." In ancient times, people used this word to describe seven bright lights that moved in the sky. They were the sun, the moon, Mercury, Venus, Mars, Jupiter, and Saturn. Over time, the sun and moon were struck from the list, and Earth was added. As telescopes improved, and astronomers were able to calculate that other planets should exist and where to look for them, Uranus (1781), Neptune (1846), and Pluto (1930) were discovered and added to the list of planets.

Astronomers sometimes wondered whether Pluto really was a planet. It is much smaller than the other planets—smaller than the moon, in fact. It is made of ice and rock, while the others are rock or gas. And Pluto travels well above and below the plane in which the other planets orbit.

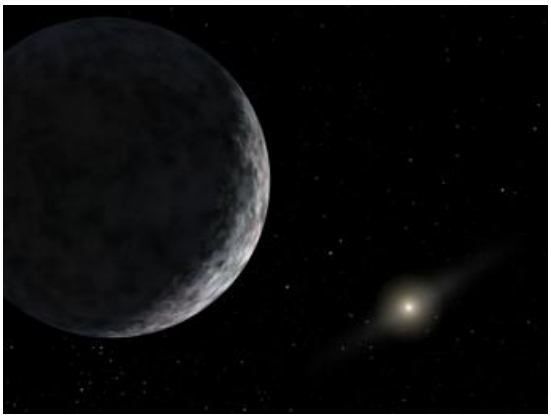
KBOs

In the early 1990s, astronomers found a band of icy rocks beyond Neptune, orbiting the sun. They named it the Kuiper belt, and the rocks were called Kuiper belt objects, or KBOs. They are cosmic debris, left over from when the planets were formed.

As astronomers learned more about KBOs, many began to think that Pluto was one of them. They are made of ice and rock. They are also much smaller than the other eight planets. Pluto is close in size to the biggest KBOs. And some KBOs travel in the same tilted orbit that Pluto does.

A New Definition

In 2005, the discovery of Eris, a KBO bigger than Pluto, brought the problem to a head. Was Eris the tenth planet? A hot debate broke out. The International Astronomical Union (IAU), which defines objects in space, formed a working group to define a planet. The group couldn't agree on a definition, so a second group was formed.



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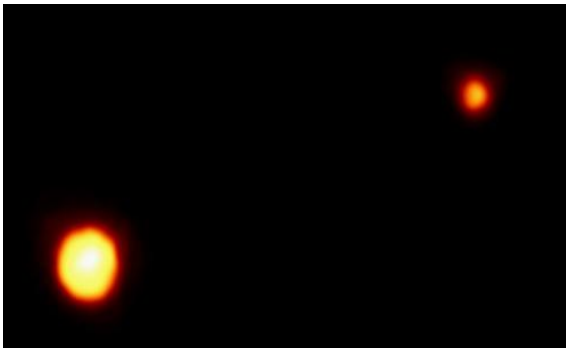
This group started with the idea that a planet had to be round. That is, it had to be big enough—to have enough mass—that its gravity pulled it into a round shape. A planet, the group decided, also had to orbit a star. Finally, it could not be a star itself or the moon of a planet.

Under the plan, Pluto would have stayed a planet, and there would have been three new planets: the giant asteroid Ceres, Eris, and one of Pluto's moons, Charon.

But wait a moment. How could a moon be a planet? The group's definition had said it could not.

The answer has to do with the gravitational tug of war between planets and their moons. All the other planets are so big that the center of that war—the point around which the moon revolves—is within the planet. The planet also makes a small movement around that point. But for tiny Pluto, the center is outside the planet. Charon isn't orbiting Pluto but a point between them. And Pluto is orbiting that point, too. This arrangement, sometimes called a *double planet*, made Charon a planet by the definition.



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In August 2006, the group presented its definition to the IAU General Assembly. Some people liked it, but many did not. Some said it had too many exceptions, like the one for double planets. Too many objects could be planets. Others thought that more than roundness had to be considered. The members argued and talked and finally agreed on this definition:

- A planet must orbit the sun.
- It must be large enough to have taken on a round shape.
- It must have "cleared the neighborhood around its orbit."

This last point is the "something more than roundness" that some astronomers wanted. As it forms, a planet swallows up or flings off the cosmic debris around it. Objects that get too near a planet are pushed away or pulled in by gravity and smashed. A planet holds some objects like moons in orbits around it. Except for these objects, and things like comets and asteroids that are passing through, a planet's neighborhood is pretty empty.

This is the standard Pluto doesn't meet. Both Pluto and Eris share their orbit with other KBOs. Ceres, in the asteroid belt, shares its orbit with other asteroids. None of them runs its neighborhood. None of them has cleared its orbit of the material surrounding it.

Pluto, Ceres, and Eris became the first three *dwarf planets*. A dwarf planet is the same as a planet, except that it has not "cleared the neighborhood around its orbit."

Finally, the IAU created a third class of objects, called *small solar-system bodies*, which is everything else that orbits the sun except moons. Most asteroids, KBOs, and comets are in this group.

These definitions set objects apart by their role in the life of a solar system. Our system, like others, began as a flat disk of dust and gas revolving around a star. It developed by *accretion*, the pulling together of this dust and gas into larger bodies. Planets were the winners in this process. They grew larger than anything else and carved out their orbits. The many leftovers, like asteroids and KBOs, did not.

Eight Planets…and Counting

In Greek mythology, Eris is the goddess who causes anger and fighting. The discoverers of Eris proposed that name to the IAU because of the conflict their new find stirred up among astronomers. Some astronomers don't like the new definition. Even those who support it see faults in it. One problem, for example, is that it applies just to objects that orbit the sun, not objects that orbit other stars. Even the best understanding of things can be shaken up when fresh facts arise to challenge it. That's science.

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