

Nine no longer: Panel declares 12 planets

By Gareth Cook, Globe Staff | August 16, 2006 Boston.com

The solar system has 12 planets.

That is the conclusion, to be announced today, of an international panel formed to devise a scientific definition of a planet and settle an increasingly intense dispute over whether Pluto qualifies. The panel suggests retaining Pluto and immediately adding three new planets to the nine that are familiar to any schoolchild: Ceres, currently considered a large asteroid; Charon, now considered a moon of Pluto; and Xena, a recently discovered object that is larger than Pluto.

But the group's proposal also makes clear that many more objects in the solar system -- perhaps dozens of them -- could qualify as planets after further study.

The new definition has been approved by the executive committee of the International Astronomical Union, and a vote of the union's general assembly is scheduled for Aug. 24 at a conference underway in Prague. If it is approved, which several astronomers said seems likely, the world's textbooks and museum displays would have to be updated -- not to mention solar system models, posters, software, and toys with only nine planets.

The change, scientists say, would be a mark of the great age of discovery that astronomy has entered over the last three decades, with the advent of space probes, powerful telescopes, and new observational techniques.

The current model of the solar system has held since 1930, when Pluto was discovered. Since then, astronomers have discovered that the solar system is a much larger, more diverse place. These discoveries, especially the findings that Pluto is markedly different from the other planets and is part of a vast cloud of frozen worlds known as the Kuiper Belt, have challenged the neat categories in the nine-planet solar system. Faced with these problems, the Astronomical Union has been struggling for years to work out its first formal definition of a planet.

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"It is wonderful when new scientific discoveries present you with new problems," said Richard Binzel, a Massachusetts Institute of Technology professor of planetary geology who served on the panel. "This is almost the essence of being a scientist."

The proposal defines a planet as an object that circles the sun and is massive enough that its own gravitational forces compress it into a roughly spherical shape. Depending on its composition, a planet would have to be at least roughly 250 to 500 miles in diameter to qualify. It designates a new subcategory of planet, the "pluton," a Pluto-like planet that takes at least 200 years to circle the sun. Pluto, Charon, and Xena are all plutons, and scientists expect many more to be discovered. Under the proposal, Ceres is an ordinary planet.

Moons are excluded from planetary status, using a criterion that depends on the relative mass of two bodies that are gravitationally tied. If one body is much smaller than the other, then it is considered a moon. Pluto and Charon are closer in mass, and so they are dubbed a double planet. The Earth's moon is round and much larger than Pluto, but it is so much smaller than Earth that it is considered a moon, not a planet.

The result of this reconfiguration is a jarring new view of the Earth's neighborhood. Between Mars and Jupiter is a vast belt of asteroids, presided over by the planet Ceres, named for the Roman goddess of agriculture. At the solar system's fringes is another vast belt of icy objects, the plutons, with Xena being the largest known, slowly orbiting the sun.

Many other objects will probably be added to the ranks of planets, scientists said. The panel in Prague provided a list of leading contenders that includes the recently discovered Sedna, Orcus and Quaoar, in the Kuiper Belt, as well as the large asteroids Vesta, Pallas, and Hygiea.

There are 53 objects that meet the panel's criteria and probably many more to be discovered, according to Michael Brown, an astronomer at the California Institute of Technology who discovered Xena. (Brown dubbed the body Xena after the television series about a warrior princess, but it is officially known as "2003 UB313," and has not been given a permanent name.) The total number of planets, Brown said, could easily climb above 100.

A new panel of the astronomical union will be charged with designating planets, and it will be its job to determine if astronomers have proven that a particular body is sufficiently round to qualify.

A number of scientists said in interviews that they expected the new definition would be accepted, but others, including Brown, opposed the idea. Calling it "a big mess," Brown said he didn't like the complexity of the system, or the idea of a panel determining what new planets are.

Brown said he would have preferred to simply declare that anything as large as Pluto is a planet, meaning there would be 10 planets -- the existing nine and Xena -- with the possibility that a few more would be discovered. Also reasonable, he said, would have been to disqualify Pluto as a planet, because of differences like its small size and its different orbit.

The international scientific community has never agreed on an official definition for a planet. The word "planet" comes from the Greek word for "wanderer," a name Greek astronomers chose because they observed with the naked eye seven celestial objects that moved in relation to the backdrop of stars: Sun, Moon, Mercury, Venus, Mars, Jupiter, Saturn.

This picture changed when it became clear by the 17th century that Earth revolved around the sun, and the Moon orbited the Earth. The subsequent discoveries of Uranus, Neptune, and Pluto each caused a sensation, expanding the reach of the solar system, according to Dava Sobel, a science writer who served on the panel.

Ceres was considered a planet when it was discovered in 1801, but it was later demoted when scientists discovered that it was part of a large belt of similar asteroids, making it seem quite different from the planets known at the time. In recent years, some scientists have argued that Pluto, too, should be demoted, after it was realized that it was only one of many objects much smaller than the other planets that haunt the edge of the solar system.

The panel's proposal, which was hashed out a month and a half ago in a former stable of the Paris Observatory, saves Pluto from demotion, and rehabilitates Ceres, which glimmers bright enough to be seen with binoculars.

This challenging new portrait of the solar system should be seen as an opportunity, according to Michael Smith, a science textbook author and seventh-grade science teacher in Delaware. The decision helps illustrate, he said, that science is not a static set of facts, but a constant conversation. He said he was eager for school to start so that he could share the findings with his students and lead a discussion about all the different objects in the solar system, how they might be grouped, and how this might change as new information comes in.

"I am thrilled," he said.

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