Why is Pluto not a Planet?

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On August 24 2006, the International Astronomical Union (IAU) took a historic decision. It defined the criteria that must be satisfied by a solar system body for it to be considered a planet. The crucial body to be affected by this decision was the erstwhile planet Pluto. According to the new criteria, Pluto could not be classified as a planet. What are those criteria?

The first criterion is that the body should orbit the Sun. The second is that it has sufficient mass to have strong enough gravitational force to overcome internal rigid body forces and attain a spherical shape. The third requirement is that it has a cleared neighbourhood around its orbit; that is there should not be any other body of comparable mass and size near it. Pluto passes the first two tests but fails the third. Its satellite Charon is comparable to Pluto.

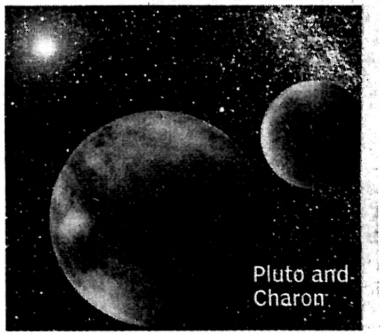


A way of seeing the last requirement is to look at the Earth-Moon system. Both have a common centre of mass around which the Moon-Earth axis revolves. The distance of the centre of mass from either body depends on how massive it is. The more massive a body is compared to the neighbour, the closer is it to the centre of mass. When two kids balance on a seasaw, for the sea-saw to be horizontal, the heavier kid has to be closer to the centre. The mass of the Earth is, likewise, considerably larger than the mass of the Moon with the result that their centre of mass lies lies so close as to be inside the Earth. But for the Pluto-Charon pair, this is not the case. Their centre of mass lies in the free space outside either body. So we cannot say that Charon orbits Pluto. Rather, we have to say that Pluto and Charon go round each other as the pair goes round the Sun.

So the solar system is back to the state prevailing up to the 1920s, namely, that it has eight planets. Pluto is relegated to another category, called the dwarf planet. It just failed to be a planet for not being large enough. We should note that astronomers have been talking about dwarf stars and dwarf galaxies long before Pluto was demoted. Like Pluto, there are other bodies that satisfy the first two criteria but not the third. Ceres, Eris, Haumea and Makemake are other examples of dwarf planets.

This is an opportune occasion to clarify that the Navagrahas (nine planets) talked about by astrologers are not all the same as the nine planets in astronomy (before Pluto was demoted.) For example, Rahu and Ketu included in *Navagrahas* are not real objects but are nodes from the geometry of the motions of the Earth and the Moon. Even with real objects, the mistake is made of including the Sun (which is a star, not a planet) and the Moon (which is a satellite, not a planet).

We may mention in the end, that the need for a precise definition of a planet was felt because in recent years, astronomers are findings other stars (than the Sun) with orbiting smaller neighbours. They are mostly called planets...but one needed to be sure what alien body to call a planet and what not to call a planet.


Pluto and Charon

(Next week: First Astronomical Use of a Telescope)

Astrophysicist Jayant Narlikar and theoretical physicist Thanu Padmanabhan will contribute to DNA's special series through 2009, designated the International Year of Astronomy.