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PLUTO

Ken Tapping, 25th March, 2014

Imagine a world dark unbelievably cold, -230 C, and which has been so for billions of years. In the sky of that world, the Sun is just a very bright star. A clear night on that world is clearer and darker than any we have on Earth. The atmosphere is mainly a rarified mixture of gases like carbon monoxide, methane and nitrogen. Sometimes a thin snow of frozen nitrogen and methane falls onto rocky surface frosted with frozen methane and patches of reddish ethane and other hydrocarbons. Ice is a solid mineral. It is hard to imagine how any form of life we are familiar with could live there. There are at least five moons in the sky, which we have named Charon, Nix, Hydra, Kerberos and Styx, all appropriate companions for a world we named Pluto, the Roman god of the underworld, although some of those moon names are of Greek origin, and apply to Hades, the Greek god of the underworld.

In the 1840's many scientists were using Newton's theory of gravity to analyze the motion of the known planets in the Solar System. In doing so they found discrepancies between the predicted positions of planets and where they actually were. This in turn led to the idea that these discrepancies were due to unknown planets perturbing the motions of the planets we knew about.

Analysis of the perturbations in the motion of the planet Uranus, the seventh planet out from the Sun, led to a prediction of an eighth, and where in the sky to look for it. In 1846 it was found, and named Neptune. Then, when the motions of this new planet were examined, astronomers concluded that it was being perturbed by yet another unknown body, orbiting even further from the Sun. This became known as Planet X.

In 1906 the search for Planet X got underway. Nobody found anything. In 1929 the search was handed over to Clyde Tombaugh, who was given some areas of sky to search. In 1930 he found the planet. The name given to it, Pluto, was proposed by a schoolgirl in Oxford, England. Her grandfather

was a professor, which is how her suggestion got launched into the astronomical grapevine.

Pluto was called the outermost known planet in the Solar System. However, soon after its discovery, problems started to appear. First of all its orbit did not fit the examples set by the other planets. The eight other orbit the Sun in concentric, slightly elliptical paths, with none crossing paths, so, for example, Mars, the fourth furthest planet from the Sun, is always the fourth furthest. However Pluto's path took it across Neptune's orbit, so sometimes it was closer to the Sun than Neptune. Moreover Pluto's orbit was inclined at a significant angle to the paths of the other planets. The argument about whether Pluto is a genuine "planet" got started.

The calculations that led to the discovery of Pluto indicated the new planet would have a mass close to that of the Earth. However, every attempt to calculate the mass of Pluto suggested a much smaller mass. In 1931 the estimate was about the mass of the Earth. Subsequent determinations yielded lower and lower masses. The latest is less than a quarter of a percent of the Earth's mass. This is interesting in that Pluto is too small to produce the perturbations that led to its discovery! So astronomers got back to searching for the Real Planet X. This quest was unsuccessful, and then the mathematicians reported that the gravitational perturbation calculations had been wrongly interpreted, and there was no need to have a Planet X to explain what Neptune was doing after all! So as far as Pluto is concerned, Clyde Tombaugh just happened to find it because he just happened to be looking in the right direction.

Jupiter lies high in the south at nightfall and sets around 3:30am. Mars and Saturn rise around 10pm and midnight respectively. Venus rises around 6am, and is getting lost in the dawn twilight. The Moon will be New on the 30th.

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