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URANUS – PLANET 7

Ken Tapping, 23rd January, 2018

Uranus, the 7th planet out from the Sun, was discovered by William Herschel in 1781. It was the first planet to be discovered using a telescope. The other planets known at that time were visible to the unaided eye and had been known for many centuries. Through Herschel's telescope, the new planet was just a faint, blue-green disc. Herschel wanted to name the planet after King George III. Luckily, the new planet was officially named Uranus, after the Greek god of the sky.

Uranus is a "Gas Giant" planet, like Jupiter and Saturn. It is about 51,000 km in diameter. It is much larger than the Earth, which has a diameter of 12,756 km, but smaller than Jupiter (143,000 km) and Saturn (121,000 km). It has about 14.5 times the mass of the Earth, which is low compared with the planet's size, which shows, as in the case of Jupiter and Saturn, that it must be mostly gas. However, unlike Jupiter and Saturn, which appear through telescopes as tan or yellowish coloured discs, Uranus is blue-green.

All the gas giant planets have atmospheres containing mainly hydrogen, ammonia and methane. However, what happens depends on the amount of solar energy each planet receives, how much energy is coming up from the core, and how fast the planet is rotating. Jupiter is top in all three cases. Its atmospheric gases have combined into a wide range of coloured chemicals, which are lifted up through the atmosphere by convection and huge storms. This gives us that tan-coloured disc, coloured cloud bands and spectacular storm vortices. Saturn, further from the Sun, comes second, it presents a tan disc with fainter cloud belts and smaller storms. Uranus comes third. Storms are much smaller and less dramatic, and usually white coloured. The less turbulent, colder atmosphere has permitted methane to float up to the top, forming a layer. Methane absorbs red light, so reflected sunlight passing through the layer becomes predominantly blue and green,

giving the planet its colour. However, there are odder things about Uranus.

All the other planets have their axes of rotation more or less perpendicular to the plane in which they orbit the Sun. Imagine some ballerinas pirouetting while on a rotating stage. In this case, Uranus is a ballerina who has fallen over. The planet looks as though it is "rolling around the Sun". We understand how ballerina planets would form in a collapsing cosmic dust cloud, but that does not account for Uranus' situation, so that planet has been a puzzle since it was discovered. The most widely accepted idea is that something collided with it very hard. With the well behaved other planets of the Solar System, Uranus' fate seemed unusual. When we started to detect planetary systems orbiting other stars, we started to get answers, but not what we expected.

We have now found thousands of planets orbiting other stars. However, hardly any of these planetary systems are like the Solar System, with rocky planets closer in and gas giants further out. Some stars have Jupiter-like planets orbiting closer to their star than the planet Mercury orbits ours. This could only happen by collisions and close gravitational interactions. With the exception of Uranus, our Solar System looks well behaved. Since life appeared in the Earth's oceans at least 3.5 billion years ago, our planet's orbit must have remained stable for at least that long.

Uranus has many moons. The largest have been named Titania, Miranda, Umbriel and Oberon, all Shakespearean characters. It's possible that William Herschel's son John had a hand in this.

Jupiter and Mars rise in the early hours. Mercury and Saturn are low in the dawn twilight. The Moon will reach First Quarter on the 24th.

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