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THE OTHER BLUE PLANET

Ken Tapping, 30th January, 2018

Neptune, the 8th planet out from the Sun, was the first to be discovered by measurements, rather than spotting something unknown in the sky. It was thanks to Isaac Newton that the discovery was possible at all. He proposed that every lump of mass in the universe attracts every other piece with a force he called gravity.

When Johannes Kepler, in the early 17th century, suggested that the planets all orbit the Sun in almost-circular orbits, he assumed the only important forces were between the Sun and each individual planet. Later that century, and in the early 18th century, Isaac Newton explained what Kepler proposed, and indicated something more. Not only do we have to consider the attraction between the Sun and a planet; we have to include the attractions the planets have for each other.

After the planet Uranus was discovered, careful position measurements were made in order to precisely determine its orbit. Unless this were done, it would be impossible to predict where it would be in future years. Position measurements were made and compared with the predictions, and found to be slightly but consistently different. In the 19th century, John Couch Adams in Cambridge, UK and Urbain Le Verrier in Paris, France concluded the errors were due to some unknown planet tugging at Uranus. So they set out to calculate how big a planet it would have to be and where in the sky to look for it. Since Uranus is so far away, it takes a telescope to see it at all, the unknown planet would be fainter than Uranus.

Both men's calculations were correct. However, when Adams reported his discovery to George Airy, the Astronomer Royal, in charge of the Royal Greenwich Observatory, his work was ignored. Le Verrier was more lucky. The telescope at the Paris Observatory was pointed in the right direction and there was the new planet. Airy realized his Big Mistake afterwards but it was too late. Le Verrier got the kudos and Adams got nothing.

Neptune is the next planet out from the Sun after Uranus. It is a bit smaller than Uranus, 49,500 km in diameter compared with Uranus' 51,000 km. Once again its mass is small compared with its size, only 17 Earth masses, indicating a low density and that this planet, along with Jupiter, Saturn and Uranus, is mostly gas – a gas giant planet; very much like Uranus but a bit colder. This has allowed a thicker, colder layer of methane to form in Neptune's upper atmosphere, so whereas Uranus is green-blue, Neptune is a deep, ocean blue, which is why the planet is named after the Roman God of the Sea. Like the other gas giants, Neptune rotates very quickly. A day on that planet is only 16 hours long. The planet is a bit less stormy than Uranus, and like Uranus its storms are white – the colour of solid methane.

The maritime approach continues with the naming of Neptune's moons, the largest of which are named Triton, Neptune's messenger, and Nereid, a sea nymph. There are twelve other known moons. Like Jupiter and Uranus, Neptune has faint rings, nothing like the spectacular rings of Saturn.

Now that Pluto is no longer deemed to be a planet, Neptune holds the position of outermost known planet. Astronomers are typical scientists, and are working hard to prove that's not the case.

Jupiter and Mars rise in the early hours. Saturn lies low in the dawn twilight. Mercury is now lost in the dawn glow. The Moon will be Full on the 30th. There will be a total eclipse of the Moon on 31 January. The main phase of the eclipse, when we see the full shadow of the Earth crossing the face of the Moon, will be between 06:48 and 10:11 EST, which is 03:48 and 07:11 PST. The full eclipse will only be visible in Western Canada because further east the Moon will set during the event. Try watching with a telescope.

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