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A WORLD THAT NEVER WAS

Ken Tapping, 18th February, 2014

Our ancestors noticed that while most stars stayed in fixed groupings, several moved around. The word “planet” comes from the Greek word for “wanderer”. These objects moved to and fro, but always in the same narrow strip of sky. We now know this is because the Earth and other planets all orbit the Sun in the same plane. With just their unaided eyes and patient observations, our ancestors identified the planets Mercury, Venus, Mars, Jupiter and Saturn. Further discoveries had to wait for the invention of the telescope.

The procedure used to find planets involved looking along the ecliptic for “stars” that changed position from night to night. This required an intimate knowledge of the sky and a lot of patience. In 1781 William Herschel discovered the planet Uranus using this method. Once the motions of the new planet were determined, it was found that in 1690, John Flamsteed, the first Astronomer Royal, had spotted the planet at least six times, cataloguing it mistakenly as a star. Later Pierre Lemonnier made the same error, 12 times. We still do search for new objects in the sky by looking for things that are moving compared with the background stars. However, we do it by making images and then comparing them digitally.

When Isaac Newton gave his mathematical description of gravity, a completely new method for planet detection came along. One could take the long lists of planet position measurements that were being built up by observatories and see whether the paths of those planets in the sky suggested an unknown object was tugging at them. This was how the existence of the planet Neptune was deduced.

In 1821 Alexis Bouvard published observations of the positions of Uranus and said that something was making the planet deviate from its predicted positions, and that the culprit could be an unknown planet. John Couch Adams and Urbain Le Verrier got to work independently on this data. The new

planet was discovered within a degree of the predicted position, and was named Neptune.

However, not everything went that smoothly. Astronomers were very puzzled by the movements of Mercury, the closest planet to the Sun. That planet persisted in not being at its calculated position or even following its predicted path. So Urbain Le Verrier and others started calculating and announced that these deviations suggested the existence of an unknown planet, orbiting even closer to the Sun than Mercury. It was appropriately named Vulcan. There then began an international race by astronomers to be the first to actually see the new planet. Some thought they had found it, others failed. The “successful” observations were used to calculate future positions of the planet. However, Vulcan never showed up at the predicted positions, and finally it was concluded that Vulcan was a world that never was. This meant there was still the puzzle of explaining what Mercury was up to.

The answer was something that Newton, Le Verrier and the others could not have dreamed of. The answer came in the early 20th Century, from Albert Einstein. The culprit is the Sun. Its strong gravitational attraction distorts the fabric of space. For planets lying further from the Sun, like Venus, Earth and Mars, the effect is still there but much smaller, not large enough to find without knowing what knowing what you’re looking for.

This research underlined the immense value of careful observations, properly recorded, without interpretation, because it is possible, that they might lead to a discovery that was not even in the mind of the person making those observations.

Mars, Saturn and Venus rise at 11pm, 1am and 5am respectively. Jupiter, second only to Venus in brightness, still dominates the sky overnight. The Moon will reach Last Quarter on the 22nd.

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