Rediscovering Vesta

Just two hundred years ago, on 29th March 1807, the German Astronomer, Heinrich William Mathias Olbers discovered the asteroid Vesta, the fourth one to be discovered. He had earlier discovered Pallas, in 1802, which was the second asteroid to be spotted. The very first asteroid, Ceres, was discovered on the first of January 1801, by Piazzi.

Ceres is still the largest asteroid to have been discovered. It is almost thousand kilometres across and thus qualifies as a minor planet, a 'new' category of celestial objects, which now includes Pluto (in its demoted status!). After its discovery, Ceres was 'lost' for some time and it was indeed Olbers, who recovered it in January 1802 (just one year after its initial discovery) in the position predicted by the great mathematician, Carl Freidrich Gauss, who pioneered many new contributions in celestial mechanics, among his many other discoveries.

Olbers discovered Vesta from Bremen. So, he was connected with the discovery of three of the four largest asteroids to be found in the first decade of the nineteenth century. The third asteroid, Juno, was discovered by Harding in 1805.

Actually, Olbers was an amateur astronomer and a German physician and was around fifty, when he discovered Vesta. He is better known for the so called Olber's paradox, which played a crucial role in discussions in cosmology pertaining to an infinite static universe.

The paradox known by his name was first pointed out by Olbers in 1823. It pertains to the simple observation that the night sky is dark! This apparently contradicts the theoretical expectation that an infinite, static universe, more or less filled uniformly with stars and galaxies etc., should in reality be as bright as the surface of a star and the night sky just would not be dark (a simple calculation shows that!).

Olbers published his discussion of it in 1826. The paradox is resolved by removing its incorrect assumptions, that is, the universe is not infinite, having been in existence for only about fourteen billion years and is also evolving, its expansion (as discovered much later by Hubble) diminishing the light from distant sources. So, the paradox played a useful role in subsequent discussions of cosmological models.

Olbers also developed a method to calculate the orbit of a comet he discovered in 1796 and gave an early explanation of comet's tails being pushed away by solar radiation pressure.

The asteroid, Vesta, which he discovered exactly two hundred years ago, turned out to be a unique object in its own right. It is sufficiently different from other asteroids to be assigned a special class, V (for Vesta). It has a rather high albedo and at particularly favourable oppositions, it is the only asteroid bright enough to be visible with the naked eye. It may be a source of the eucrite meteorites.

Its spectrum is characteristic of pyroxene, a mineral common in lava flows. The Hubble Space Telescope has indicated bright and dark features as small as seventy kilometres across, on Vesta, indicating a geologically diverse terrain with an exposed mantle, lava flows and impact basins. It has a high mean density (almost eighty per cent of that of the earth), almost twice that of an average asteroid.

Its colour changes slightly as it rotates on its axis every five and a half hours suggesting a non-uniform surface. It has an orbital period of three and a half years.

Two hundred years after Olber's discovery, we now know the existence of several hundred thousand asteroids. Over a thousand of the Near Earth Objects (NEOs), that is, asteroids more than around one kilometre in diameter, have been monitored to see if any of them could in future be on a collision course with the Earth.

The object, Apophis is expected to approach the earth to within thirty thousand kilometres in April 2029. Fortunately, the overwhelming majority are in the asteroid belt between the orbits of Mars and Jupiter.

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