THE SURMISE OF VULCAN

The Story of the Hypothetical Intra-Mercurian Planet

by

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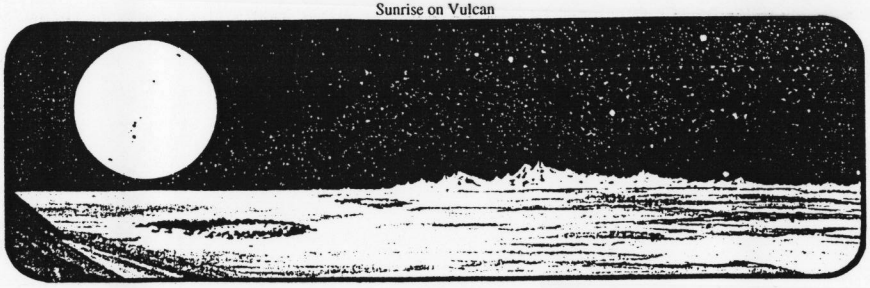
Sunrise on Vulcan



Since the invention of the telescope in the early 1600's several major planets have been discovered in the remote regions of interplanetary space beyond the realm of Saturn, namely Uranus, Neptune, and Pluto. The search for more such planets has continued to some extent even to this day. In the last century, although, a flurry of serious speculations were circulating among world class astronomers about the possible existence of a planet not at the outer reaches of the Solar system but at the inner region of the planetary family, inside the orbit of Mercury. This suspected planet precipitated the exploration of the Sun's immediate neighborhood resulting in a number of cases where observers have reported such a body.

At one time it was believed that there was a planet even closer to the Sun than Mercury based on unexplained orbital perturbances observed in the latter caused by the gravitational influence of a supposed heretofore undiscovered object hidden in the Solar glare. It was already known that the point of planet Mercury's orbit closest to the Sun was progressively

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38 seconds per century greater than would be predicted on the basis of Newtonian mechanics.

In 1845 a French astronomer by the name of Urbain Le Verrier (1811-1877), attempted to resolve this problem by proposing the existence of a planet lying inside the orbit of Mercury which he named Vulcan, after the Roman god of fire and the blacksmith of the gods. Subsequently he began to look for it. Previously he had made extensive mathematical studies on the motions and variations in planetary orbits and became an expert on the subject in his own right. His confidence was such that he named his planet before he ever found it. Consequently, Le Verrier was delighted when, in 1859, he received a report from an amateur astronomer by the name of Dr. Lescarbault, a country physician, who lived in the small town of Orgenes, some 80 miles from Paris. Dr. Lescarbault, who had read some of Le Verrier's published work, claimed he had actually watched the passage of such an object crossing the solar disk on the 26th of March, so Le Verrier made haste to go and see him. It must have been a strange meeting. By this time Le Verrier was director of the Paris Observatory and internationally famous as a co-discoverer of Neptune. He is said to have been such a rude man that he was once forced to resign his post which he returned to later upon the death of his successor in a boating accident. Lescarbault, on the other hand, was intensely shy, and very much of a novice. He was the local Doctor but also a carpenter and he would work out his calculations on planks of wood planing them off when he had no further use for them and to make room for new ones. His equipment included instruments rough and home made but singularly accurate. His clock was a simple pendulum, consisting of an ivory ball suspended from a nail by a silk thread. His observations were recorded on prescription paper, covered with grease and ladanum. Based on the doctor's evidence and satisfied as to the genuineness of this enthusiastic observer's work Le Verrier congratulated and honored him as the "discoverer" of Vulcan, and "confirmed" the discovery. He calculated that Vulcan was an object 1,000 miles in diameter giving it an apparent diameter from Earth of about three arc seconds, occupying an orbit 18 1/2 million miles from the Sun with a revolution period of 33 days, and an orbit inclined 12 degrees to the ecliptic. Vulcan was later even given the sign of a hammer as a legitimate planetary symbol.

Other observers had, at various times, seen spots of a planetary character rapidly cross the disk of the Sun although the observation of

Lescarbault turned out to be the most remarkable since it seemed to justify the theoretical conclusions of Le Verrier. After he analyzed all the observations of this sort that he could find, which numbered about 50, and calculated a satisfactory orbit Le Verrier thereafter announced that there would be a transit of Vulcan across the face of the Sun on March 22, 1877. The astronomers of the world awaited in vain when that day finally arrived.

Since then there has been no confirmation of the existence of the hypothetical planet Vulcan. Even though Le Verrier was the originator of the quest he was by no means the only astronomer of the time, or since, to be seeking an intra-Mercurian planet. Others far and wide also had the idea, including Heinrich Schwabe (1789-1875) of Dessau, renowned for Sunspot research, for instance, as well as Lummis of Manchester, Watson of Ann Arbor, and Swift of Rochester. However, all attempts optically to detect a planet in this location have failed. What Dr. Lescarbault saw was probably a Sunspot. Vulcan has never been seen as a morning or evening star like Mercury or Venus, nor has it been seen in the vicinity of the Sun during the few moments of darkness of a total Solar eclipse when even faint stars can be made out. The elaborate photographic campaign conducted during the solar eclipse of 1905 failed to detect any "planetules". Furthermore, Vulcan has never been seen as a dot moving in transit against the Solar disk. Nevertheless the incident received wide publication over the years in many interesting accounts.

The mysterious anomaly in Mercury's orbit went on unexplained until it was used by Karl Schwarzchild in 1916 to support Albert Einstein's General Theory of Relativity, which predicted such an advance in Mercury's perihelion. Even if there were one or more intra-Mercurian asteroids, they must be very minute, as an object as small as 200 miles in diameter would hardly have escaped notice. In 1902 Perrine, then at Lick Observatory in California, wrote that if any such bodies exist they must be less than 35 miles in diameter and have a brightness of less than magnitude 7.7. Had such a planet as Vulcan been actually discovered, after all, planetary observers would have a telescopic target that would never be much more than about 14 degrees above the horizon at sunrise or sunset and indeed a challenging object to decipher in the bright sky of twilight.

It is rather interesting that Le Verrier accepted the correctness of Lescarbault's observation almost without question. To the end of his life Le Verrier continued to believe in his prematurely named intra-Mercurian

planet. But years of careful observations have made it almost certain that there is no "Vulcan".

> Then I beheld all the work of God, that a man cannot find out the work that is done under the sun: because though a man labor to seek it out, yet he shall not find it; yea farther; though a wise man think to know it, yet shall he not be able to find it. (Ecclesiastes 8:17.)