

lites or secondary planets, and myriads of comets, three of which, known as the "planetary comets," do not pass beyond the narrow limits of the orbits described by the principal planets. We may, with no inconsiderable degree of probability, include within the domain of our Sun, in the immediate sphere of its central force, a rotating ring of vaporous matter, lying probably between the orbits of Venus and Mars, but certainly beyond that of the Earth,\* which appears to us in

formal incompatibility between the observed motions of Uranus and the hypothesis that he was acted on *only* by the Sun and known planets, according to the law of universal gravitation." Pursuing this idea, Leverrier arrived at the conclusion that the disturbing cause must be a *planet*, and, finally, after an amount of labor that seems perfectly overwhelming, he, on the 31st of August, 1846, laid before the French Institute a paper, in which he indicated the exact spot in the heavens where this new planetary body would be found, giving the following data for its various elements: mean distance from the Sun, 36.154 times that of the Earth; period of revolution, 217.387 years; mean long., Jan. 1st, 1847,  $318^{\circ} 47'$ ; mass,  $\frac{1}{9300}$ th; heliocentric long., Jan. 1st, 1847,  $326^{\circ} 32'$ . Essential difficulties still intervened, however, and as the remoteness of the planet rendered it improbable that its disk would be discernible by any telescopic instrument, no other means remained for detecting the suspected body but its planetary motion, which could only be ascertained by mapping, after every observation, the quarter of the heavens scanned, and by a comparison of the various maps. Fortunately for the verification of Leverrier's predictions, Dr. Bremiker had just completed a map of the precise region in which it was expected the new planet would appear, this being one of a series of maps made for the Academy of Berlin, of the small stars along the entire zodiac. By means of this valuable assistance, Dr. Galle, of the Berlin Observatory, was led, on the 25th of September, 1846, by the discovery of a star of the eighth magnitude, not recorded in Dr. Bremiker's map, to make the first observation of the planet predicted by Leverrier. By a singular coincidence, Mr. Adams, of Cambridge, had predicted the appearance of the planet simultaneously with M. Leverrier; but by the concurrence of several circumstances much to be regretted, the world at large were not made acquainted with Mr. Adams's valuable discovery until subsequently to the period at which Leverrier published his observations. As the data of Leverrier and Adams stand at present, there is a discrepancy between the predicted and the true distance, and in some other elements of the planet; it remains, therefore, for these or future astronomers to reconcile theory with fact, or perhaps, as in the case of Uranus, to make the new planet the means of leading to yet greater discoveries. It would appear from the most recent observations, that the mass of Neptune, instead of being, as at first stated,  $\frac{1}{9300}$ th, is only about  $\frac{1}{53000}$ th that of the Sun, while its periodic time is now given with a greater probability at 166 years, and its mean distance from the Sun nearly 30. The planet appears to have a ring, but as yet no accurate observations have been made regarding its system of satellites. See *Trans. Astron. Soc.*, and *The Planet Neptune*, 1848, by J. P. Nicholl.]

—Tr.

\* "If there should be molecules in the zones diffused by the atmos