

ously directed to the same important end, present in their laudable competition so much the more interest, as they testify, by the selection of means, to the present distinguished condition of higher mathematical knowledge.

### THE SATELLITES OF NEPTUNE.

While in *exterior* planets the existence of a *ring* presents itself only in one solitary instance, and its rarity permits of the conjecture that the organ and formation of an unconnected girdle depends upon the conjunction of peculiar and difficultly fulfilled conditions, so, on the contrary, the existence of satellites accompanying the *exterior* planets (Jupiter, Saturn, Uranus) is a phenomenon as universal as the former is rare. Lassell discovered with certainty\* the first satellite of Neptune so soon as the commencement of August, 1847, in his large twenty-foot reflector, with a 24-inch aperture. Lassell's discovery was confirmed by Otto Struve† at Pulkowa

I once told you that I have worked much upon this subject, but have come to no other result than the *certainty* that the present theory, or, much rather, its application to the *solar system*, as we are acquainted with it, was insufficient to solve the mystery. Nevertheless, it must not, on that account, be considered upon my opinion to be unsolvable. We must first know accurately and completely what has been observed of Uranus. By the aid of one of my young hearers, Flemming, I have had all the observations reduced and compared, and thus the existing facts now lie before me complete. While the old observations do not agree with the theory, the more recent ones agree still less; for now the error is a whole minute, and increases annually about 7" to 8", so that it will soon be much greater. I was therefore of opinion that the time might come when the solution of this mystery might perhaps be found in the discovery of a new planet whose elements might be ascertained by its influences upon Uranus, and confirmed by those exerted upon Saturn. That this time has already arrived I am far from saying, but I shall *examine* now *how far* the existing facts can carry us. This is an investigation which I have pursued for so many years, and on account of which I have followed so many views, that its results especially interest me, and shall therefore be brought to an end as soon as possible. I have great confidence in Flemming, who will, in Dantzic, to which place he has been called, continue the same reduction of observations for Saturn and Jupiter which he has now made for Uranus. It is, in my opinion, fortunate that he has (for the present) no means of observation, and has no lectures to deliver. A time will indeed come when he must institute observations *with a definite aim*; then he should no longer want the means of carrying them out any more than he does the ability to do so."

\* The first letter in which Lassell announced the discovery was on the 6th of August, 1847. (Schumacher, *Astr. Nachr.*, No. 611, p. 165.)

† Otto Struve, in the *Astr. Nachr.*, No. 629. August Struve, in Dorpat, calculated the orbit of the first satellite of Neptune from the observations at Pulkowa.