V. By Eclipses of Jupiter's Satellites.

740. The eclipse or disappearance of a satellite in the shadow of the planet, called the *Immersion*, or the re-appearance after eclipse, called the *Emersion*, being an occurrence which takes place at the same absolute point of time wherever the spectator may be placed, affords a ready method of finding the longitude.

The diagrams of the positions of the planet and its satellites, as seen in N. lat., and other necessary information, are given in the *Nautical Almanac*. The figures must be reversed in S. lat. It will assist the observer to bear in mind, that when Jupiter comes to the meridian before midnight the whole eclipse (both immersion and emersion) takes place on the E. side of the planet; when after midnight, on the W. side. In an inverting telescope this will appear inverted.

741. *The Observation.*—The telescope should have a magnifying power of not less than 40, and the observer should be ready some minutes before the time of observation, estimated by applying the long. by acc. to the time in the *Nautical Almanac*.

The sun should not be less than 8° below the horizon, nor Jupiter less than 8° above it, for the phenomenon to be distinctly visible.

742. *The Computation.*—The difference between the M. T. at place, found by observation, and that at Greenwich, is the long.

Ex. Oct. 6th, 1822, near Igloolik, lat. 69° 21′ N., immersion of the 1st satellite, $10^h\ 29^m\ 33^s$, M. T. The M. T. at Gr., in the *Nautical Almanac*, is $15^h\ 56^m\ 0^s$; the diff., $5^h\ 26^m\ 27^s$, long. W.

743. *Degree of Dependance.*—This method, though easy and convenient, is not very accurate; the eclipse is not instantaneous; and the clearness of the air, and the power employed, affect considerably the time of the phenomenon, in which observers have been found to differ 40′ or 50′.

The observation may be considered complete only when the immersion and emersion of the same satellite are observed on the same evening, and as nearly as possible under the same circumstances. Thus, if the satellite disappear a little sooner than if the air had been clearer, it will emerge a little later from the same cause, and the mean of the two results may be near the truth.