

dus (1,244,000 geographical miles, or six times the Moon's distance). That the comet was not seen before March, 1776, and not later than October, 1781, according to Lexell's previous conjecture, is analytically demonstrated by Laplace, in the fourth volume of the *Mécanique Céleste*, from the perturbations occasioned by the Jovial system on the occasion of the approximations in the years 1767 and 1779. Leverrier finds that, according to one hypothesis respecting the cometary orbits, this comet passed through orbits of the satellites in 1779; according to another, that it remained at a considerable distance without the fourth satellite.*

The molecular conditions of the head or nucleus, so seldom possessing a definite outline, as well as the tail of the comets, is rendered so much the more mysterious from the fact that it causes no refraction, and, as was proved by Arago's important discovery (*Cosmos*, vol. i., p. 105, and note), that the cometary light contains a portion of *polarized* light, and consequently reflected sun-light. Although the smallest stars are seen in undiminished brilliancy through the vaporous emanations of the tail, and even through the center of the nucleus itself, or at least in very great proximity to the center, (per centrum non aliter quam per nubem ulteriora cernatur: Seneca, *Nat. Quæst.*, vii., 18); so, on the contrary, the *analysis* of the cometary light in Arago's experiments, during which I was present, shows that the vaporous envelopes are capable† of reflecting light, notwithstanding their extremely slight density, and that these bodies have "an *imperfect* transparency,‡ since light does not pass through them unimpeded." In this group of vaporous bodies, the solitary instances of great luminous intensity, as in the Comet of 1843, or the star-like shining of a nucleus, excite so much the more astonishment when it is assumed that their light proceeds solely from a reflection of the solar rays. Is there not, however, in addition to this, a peculiar light-producing process going on in the comets?

The brush-like membered tails emanating from the comets, and consisting of vapory matter of millions of miles in length, diffuse themselves in space, and form, perhaps, either the *resisting medium*§ itself, which gradually contracts the orbit

* Leverrier, in the *Comptes Rendus*, tom. xix., 1844, p. 982-993.

† Newton considered that the most brilliant comets shone only with reflected sun-light. "Splendent cometæ," says he, "luce Solis a se reflexa." (*Princ. Mathem.*, ed. Le Seur et Jaquier, 1760, tom. iii., p. 577.)

‡ Bessel, in *Schum. Jahrbuch* for 1837, p. 169.

§ *Cosmos*, vol. i., p. 106, and vol. iii., p. 39.