the distance c 1 (=C 1) from O P, or in the direction O p parallel to c a. In virtue of both movements, then, it will be found at x, the extremity of the diagonal of the square O x at that moment. And similarly at the end of the 2d, 3d, &c., interval, it will be found at the extremities of the diagonals of the squares next in succession, and as these all lie in one line, O E, 45° inclined both to O P and O p, it appears that in this case the resultant vibration will be rectilinear, and will be performed along the diagonal E G of the square E F G H; and thus it appears that the superposition of two rays of equal intensity, polarized in opposite (*i.e.*, rectangular) planes, results in the production of a ray polarized in a plane 45° inclined to each of the former. Moreover, the square of the diagonal being double that of either side of a square, and the intensity of a ray being measured by *the square* of the vibrational excursion of its ethereal molecules, the intensity of the compound ray will be double that of the components, or, equal to their sum. And, *vice versâ*, any polarized ray may be considered as equivalent to two rays, each of half its intensity, polarized in planes 45° inclined on one side, and on the other of its plane of polarization. It need hardly be observed that if the molecule in starting from O be moving in the direction C A, in virtue of the one vibration, and of c b in virtue of the other,—that is, if it be commencing its first semi-vibration in the one direction, and its second in the other, or again in other words, if the vibrations differ in phase by an exact semi-undulation; all the same reasoning will apply, with this