of color in a pure spectrum; but this I believe to be a subjective phenomenon depending upon contrast."

CHAPTER XIII.

Undulatory Theory.

Direction of the Transverse Vibrations in Polarization.

IN the conclusion of Chapter xiii. I have stated that there is a point in the undulatory theory which was regarded as left undecided by Young and Fresnel, and on which the two different opinions have been maintained by different mathematicians; namely, whether the vibrations of polarized light are perpendicular to the plane of polarization or in that plane. Professor Stokes of Cambridge has attempted to solve this question in a manner which is, theoretically, exceedingly ingenious, though it is difficult to make the requisite experiments in a decisive manner. The method may be briefly described.

If polarized light be *diffracted* (see Chap. xi. sect. 2), each ray will be bent from its position, but will still be polarized. The original ray and the diffracted ray, thus forming a broken line, may be supposed to be connected at the angle by a universal joint (called a *Hooke's Joint*), such that when the original ray turns about its axis, the diffracted ray also turns about its axis; as in the case of the long handle of a telescope and the screw which is turned by it. Now if the motion of the original ray round its axis be uniform, the motion of the diffracted ray round its axis is not uniform: and hence if, in a series of cases, the planes of polarization of the original ray differ by equal angles, in the diffracted ray the planes of polarization will differ by unequal angles. Then if vibrations be perpendicular to the plane of polarization, the planes of polarization in the diffracted rays will be crowded together in the neighborhood of the plane in which the diffraction takes place, and will be more rarely distributed in the neighborhood of the plane perpendicular to this, in which is the diffracting thread or groove.

On making the experiment, Prof. Stokes conceived that he found, in his experiments, such a crowding of the planes of diffracted polarization towards the plane of diffraction; and thus he held that the·