CHAPTER II

DISCOVERY OF THE LAW OF REFRACTION.

WE have seen in the former part of this history that the Greeks had formed a tolerably clear conception of the refraction as well as the reflection of the rays of light; and that Ptolemy had measured the amount of refraction of glass and water at various angles. If we give the names of the angle of incidence and the angle of refraction respectively to the angles which a ray of light makes with the line perpendicular to surface of glass or water (or any other medium) within and without the medium, Ptolemy had observed that the angle of refraction is always less than the angle of incidence. He had supposed it to be less in a given proportion, but this opinion is false; and was afterwards rightly denied by the Arabian mathematician Alhazen. The optical views which occur in the work of Alhazen are far sounder than those of his predecessors; and the book may be regarded as the most considerable monument which we have of the scientific genius of the Arabians; for it appears, for the most part, not to be borrowed from Greek authorities. The author not only asserts (lib. vii.), that refraction takes place towards the perpendicular, and refers to experiment for the truth of this: and that the quantities of the refraction differ according to the magnitudes of the angles which the directions of the incidental rays (primæ lineæ) make with the perpendiculars to the surface; but he also says distinctly and decidedly that the angles of refraction do not follow the proportion of the angles of incidence.

[2nd Ed.] [There appears to be good ground to assent to the assertion of Alhazen's originality, made by his editor Risner, who says, "Euclideum hic vel Ptolemaicum nihil fere est." Besides the doctrine of reflection and refraction of light, the Arabian author gives a description of the eye. He distinguishes three fluids, humor aqueus, crystallinus, vitreus, and four coats of the eye, tunica adherens, cornea, uvea, tunica reti similis. He distinguishes also three kinds of vision: "Visibile percipitur aut solo visu, aut visu et syllogismo, aut visu et anticipatâ notione." He has several propositions relating to what we sometimes call the Philosophy of Vision: for instance this: "E visi bili sæpius viso remanet in anima generalis notio," &c.]