

CHAPTER II.

EARLIEST STAGES OF OPTICS.

THE progress made by the ancients in Optics was nearly proportional to that which they made in Statics. As they discovered the true grounds of the doctrine of Equilibrium, without obtaining any sound principles concerning Motion, so they discovered the law of the Reflection of light, but had none but the most indistinct notions concerning Refraction.

The extent of the principles which they really possessed is easily stated. They knew that vision is performed by *rays* which proceed in straight lines, and that these rays are *reflected* by certain surfaces (mirrors) in such manner that the angles which they make with the surface on each side are equal. They drew various conclusions from these premises by the aid of geometry; as, for instance, the convergence of rays which fall on a concave speculum.

It may be observed that the *Idea* which is here introduced, is that of visual *rays*, or lines along which vision is produced and light carried. This idea once clearly apprehended, it was not difficult to show that these lines are straight lines, both in the case of light and of sight. In the beginning of Euclid's "Treatise on Optics," some of the arguments are mentioned by which this was established. We are told in the Proem, "In explaining what concerns the sight, he adduced certain arguments from which he inferred that all light is carried in straight lines. The greatest proof of this is shadows, and the bright spots which are produced by light coming through windows and cracks, and which could not be, except the rays of the sun were carried in straight lines. So in fires, the shadows are greater than the bodies if the fire be small, but less than the bodies if the fire be greater." A clear comprehension of the principle would lead to the perception of innumerable proofs of its truth on every side.

The Law of Equality of Angles of Incidence and Reflection was not quite so easy to verify; but the exact resemblance of the object and its image in a plane mirror (as the surface of still water, for instance), which is a consequence of this law, would afford convincing evidence of its truth in that case, and would be confirmed by the examination of other cases.