

**PHYSICAL OPTICS, OR THE
NATURE AND PROPERTIES OF
LIGHT: A DESCRIPTIVE AND
EXPERIMENTAL TREATISE**

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Physical Optics, or the Nature and Properties of Light: A Descriptive and Experimental Treatise
by Richard Potter

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OR,

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BY

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ERRATA.

Page 37, line 22, *for* latter *read* former.
 " " 23, " former " latter.

PHYSICAL OPTICS:
THE SCIENCE
OF
THE NATURAL PROPERTIES OF LIGHT.

INTRODUCTION.

WHEN we first endeavour to form an opinion as to *what light is*, we recur to the opposite, darkness, or privation of light, and see that light must arise from some luminous origin or shining surface, either directly or indirectly. But considering light to originate in some self-luminous surface, we recollect that there are many which give out light; such as flames of different kinds, incandescent substances, as burning charcoal, metals, and earths at high temperatures, phosphorescent substances at low temperatures, the glow-worm and many insects from animal life, the electric light, &c., besides the heavenly bodies whose existence is only known to us by the light they give out. With such variety of origins we might well despair of forming any conclusive opinion upon the nature of light; as we ascend however from the more evident properties which it presents, to others which are less so, and from these again to others which are more and more intimately connected with its essential constitution, we arrive at the means of judging of its nature, in a far higher degree than can be appreciated by those who have not followed that course of examination. We are thus led to form hypotheses of the nature of light in order to explain the

phenomena it presents; these hypotheses ought not to be accepted, however, longer than they suffice to that end.

We call a shining surface self-luminous when the light originates there; but the light from it falling on the surfaces of bodies renders them visible also; visibility meaning the property of being perceived by the eye. In this manner opaque bodies acquire a property similar to luminous origins, and it is thus that the planets shining by the light they receive from the sun, are only distinguished from the fixed stars by their motion in the heavens, or by their exhibiting determinate discs when seen in telescopes. Here we meet with the property of the reflexion of light. It is sometimes regular, as when the light falls on a polished surface, like that of water or mercury, the facets of many crystals, polished mirrors, &c.; but in others and the more common cases it is irregular, as when it falls on the rough surfaces of bodies. These latter are visible by the eye in a great variety of positions, by means of this irregularly reflected or dispersed light coming from them; the former only when the eye is so situated as to receive the regularly reflected light, supposing them to furnish no dispersed light, which, however, is never absolutely the case.

When light has been reflected, it has generally received new properties, and in some cases it is entirely polarized; on the other hand, if polarized before reflexion at a surface, the dispersed light is found to have lost its property of polarization, and to have become depolarized by reflexion.

The law of the reflexion of light at polished surfaces is so simple, that it has been known from ancient times. When an elastic ball is thrown against a hard surface, it rebounds from the surface at an angle nearly equal to that with which it impinged; the perpendicular drawn to the surface at the point of impinging, the original direction of the ball and its direction after rebounding lying all in the same plane. If the ball were perfectly elastic, the angles would be

