

the property of double refraction, *neither* of the images follows the ordinary law, but both undergo a deviation from their original plane. Now, this had never been observed to be the case in any previous trial, and all opinion was against it. But when put to the test of experiment in a great variety of new and ingenious methods, it was found to be fully verified; and, to complete the evidence, the substances on whose imperfect examination the first erroneous conclusion was founded, having been lately subjected to a fresh and more scrupulous examination, the result has shown the insufficiency of the former measurements, and proved in perfect accordance with the newly-discovered laws. Now, it will be observed in this case, first, that, so far from the principles assumed by M. Fresnel being at all obvious, they are extremely remote from ordinary observation; and, secondly, that the chain of reasoning by which they are brought to the test is one of such length and complexity, and the purely mathematical difficulty of their application so great, that no *mere* good common sense, no general tact or ordinary practical reasoning, would afford the slightest chance of threading their mazes. Cases like this are the triumph of theories. They show at once how large a part pure reason has to perform in our examination of nature, and how implicit our reliance ought to be on that powerful and methodical system of rules and processes which constitute the modern mathematical analysis, in all the more difficult applications of exact calculation to her phenomena.

(24.) To take an instance more within ordinary apprehension. An eminent living geometer had proved, by calculations founded on strict optical principles, that in the *centre of the shadow* of a small circular plate of metal, exposed in a dark room to a beam of light emanating from a *very small brilliant point*, there ought to be no darkness,—in fact, *no shadow* at that place; but, on the contrary, a degree of illumination precisely as bright as if the metal plate were away. Strange and even impossible as this conclusion may seem, it