An extract of another Letter of Mr. Newton

Author: Isaac Newton
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<503>

An Extract of another Letter of Mr.* Newton, *written to the Publisher the* 10th *of* January 167$\frac{5}{6}$, *relating to the same Argument.

BY Mr. *Gascoin*'s Letter*[1] one might suspect, that Mr. *Linus* tryed the Experiment some other way than I did; and therefore I shall expect, till his friends have tryed it according to my late Directions. In which tryal it may possibly be a further guidance to them, to acquaint them, that the Prism casts from it several Images: *One* is, that *Oblong* one of *Colours* which I mean; and this is made by two Refractions only. *Another* there is, made by two Refractions and an intervening Reflexion; and this is *Round* and *Colourless*, if the Angles of the Prism be exactly equal; but if the Angles at the Reflecting base be not equal, it will be *colour'd*, and that so much the more, by how much unequaller the Angles are, but yet not much *unround*, unless the angles be very unequal. A *third* Image there is, made by one single Reflexion, and this is always *round* and *colourless*. The only danger is in mistaking the *second* for the *first*. But they are distinguishable not only by the Length and Lively colors of the *first*, but by it's different Motion too: For, whilst the Prism is turned continually the same way about it's *axis*, the *second* and *third* move swiftly, and go always on the same way till they disappear; but the *first* moves slow, and grows continually slower till it be stationary, and then turns back again, and goes back faster and faster, till it vanish in the place where it began to appear.

If without darkning their Room they hold the Prism at their window in the Sun's open Light, in such a posture that it's *axis* be <504> perpendicular to the Sun-beams, and then turn it about its *axis*, they cannot miss of seeing the *first* Image; which having found, they may double up a paper once or twice, and make a round hole in the middle of it about $\frac{1}{2}$ or $\frac{3}{4}$ of an inch broad, and hold the paper immediately before the Prism, that the Sun may shine on the Prism through that hole; and the Prism being stay'd, and held steddy in that posture which makes the Image Stationary; if the Image then fall directly on an opposite wall, or on a sheet of paper placed at the wall, suppose 15 or 20 foot from the Prism, or further off; they will see the Image in such an *Oblong* figure as I have described, with the *Red* at one end, the *Violet* at the other, and a *Blewish green* in the middle: And if they obscure their Room, as much as they can, by drawing curtains or otherwise, it will make the Colours the more conspicuous.

This direction I have set down, that no body, into whose hands a Prism shall happen, may find difficulty or trouble in trying it. But when Mr. *Linus*'s friends have tryed it thus, they may proceed to repeat it in a dark Room with a *less* hole made in their window shut. And then I shall desire, that they will send you a full and clear description, How they tryed it, expressing the length, breadth and angles of the Prism; its position to the Incident rays and to the window shut; the bigness of the hole in the window shut through which the Sun shined on the Prism; what side of the Prism the Sun shin'd on; and at what side the light came out of it again; the distance of the Prism from the opposite paper or wall on which the Refracted light was cast perpendicularly; and the length, breadth, and figure of the space there illuminated by that light, and the scituation of each colour within that figure. And, if they please to illustrate their description with a Scheme or two, it will make the business plainer. By this means, if there be any difference in our way of experimenting,

I shall be the better enabled to discern it, and give them notice, where the failure is, and how to rectifie it. I should be glad too, if they would favour me with a description of the Experiment, as it hath been hitherto tryed by Mr. *Linus*, that I may have an opportunity to consider, what there is in that which makes against me.

So far Mr. Newton; which was thought fit to make publick with the rest, that so the Curious every where, who have a mind to try the Experiment, may find the fuller directions for their tryal.

[1] * This Letter was written to the Publisher, *Decemb*. 15. 1675. from *Leige*, where Mr. *Gascoines*, having been a Scholar of Mr. *Linus*, now deceased, resides. In it are contained these words, to which Mr. *Newton*, to whom it was communicated, seems here to have respect; *viz*. Mr. *Linus tryed the Experiment again and again, and called divers on purpose to see it, nor ever made difficulty to shew it to any one, who either by chance came to his chamber as he was doing it, or shewed the least desire to see the same. So that, for point of Experience, Mr*. Newton *cannot be more confident on his side, than we are here on the other; who are fully persuaded, that, unless the diversity of placing the Prism, or the bigness of the Hole, or some other such circumstance, be the cause of the difference betwixt them, Mr*. Newton's *Experiment will hardly stand.*