

Response to Linus's second letter concerning Newton's new theory of light and colours, dated 13 November 1675

Author: Isaac Newton

Source: EL/N1/48, Royal Society Library, London, UK

Published online: June 2014

<48r>

< insertion from the top of f 48r >

[1]M^r Isaac Newtons Answer to M^r Line's Letter; together with further directions, how to make the Experiments controverted aright written to M^r Oldenburg from Cambridge Novemb. 13. 1675.

< text from f 48r resumes >

< insertion from the top right of f 48r >

Read Nov^r: 18: 75.

Ent^d LB. 7. 275.

Pr. Trans. 121.

< text from f 48r resumes >

Sir

When you shewed me M^r Line's second Letter, I remember I told you, that I thought an answer in writing would be insignificant because the dispute was not about any ratiocination, but my veracity in relating an experiment, which he denies will succeed as it is described in my printed letters: For this is to be decided not by discourse, but new tryall of the experiment. What it is that imposes upon M^r Line I cannot imagin, but I suspect he has not tryed the experiment since he acquainted himself with my Theory, but depends upon his old notions taken up before he had any hint given to observe the figure of the coloured image. I shall desire him therefore, before he returns any answer, to try it once more for his satisfaction & that according to this manner.

Let him take any Prism & hold it so that its axis may be perpendicular to the suns rays, & in this posture let it be placed as close as may be to the hole through which the sun shines into a dark room, which hole may be about the bigness of a pease. Then let him turn the Prism slowly about its axis & he shall see the colours move upon the opposite wall first towards that place to which the sun's direct light would pass if the Prism were taken away & then back again. When they are in the middle of these two contrary motions, that is when they are nearest that place to which the sun's direct ray tends, there let him stop, for then are the rays equally refracted on both sides the Prism. In this posture of the Prism let him observe the figure of the colours & he

shal find it not round as he contends, but oblong & so much the more oblong as the angle of the Prism, comprehended by the refracting plains, is bigger & the wall on which the colours are cast, more distant from the Prism: the colours red, yellow, green, blew{,} purple succeeding in order not from one side of the figure to the other as in M^r Line's conjecture, but from one end to the other. & the length of the figure being not parallel but transvers to the axis of the Prism. After this manner I used to try the ^[2]Experiment; For I have tryed it often; sometimes to observe the circumstances of it, sometimes in order to further experiments & sometimes to show it to others, & in all my tryals the success was the same. But whereas M^r Line thinks I tryed it in a cloudy day & placed the Prism at a great distance from the hole of the window: the experiment will not succeed well if the day be not cleare & the Prism placed close to the hole, or so neare at least that all the sun's light that comes from {the h}ole may pass through the Prism <48v> also, so as to appear in a round form if intercepted by a paper immediately after it has past the Prism.

When M^r Line has tryed this I could wish he would proceed a little further to try that which I calld the Experimentum Crucis, seing (if I misremember not) he denies that as well as the other. For when he has tryed them (which by his denying them I know he has not done yet as they should be tryed) I presume he will rest satisfied.

Three or four days after you gave me a sight of M^r Line's second Letter, I remember I thereupon showd the first of these two experiments to that Gentleman whom you found with me when you gave me that visit: & whilst I was showing it to him, A. H. (a member of the R. Society.) came in & I showed it to him also. And you may remember, that R. H. two or three years agoe in a letter read before the R. Society, & transmitted to me, gave testimony not only to the Experiments questioned by M^r Line, but to all those set down in my first Letter about Colours, as having tryed them himself; & when you read M^r Line's letter at a meeting of the said Society, & was pleasd to do me the favour to propound the Experiment to be tryed in their presence, R. H. spake of it to them as a thing not to be questiond. But if it have not yet been tryed before them, & any of them, upon M^r Line's confidence, doubt of it, I promise when I shall have the happines to be at any more of their Assemblies, upon the least hint, to show them the tryal of it; & I hope, I shall not be troublesome, because it may be tryed (though not so perfectly) even without darkning a room, or the expence of any more time then half a quarter of hower; although, if M^r Line persist in his denial of it, I could wish it might be tryed sooner there, than I shall have an opportunity to be among them.

< insertion from the bottom of f 48v >

An Extract

< text from f 48v resumes >

[1] Ttt 3 501

[2] Tttt 4 502
