Author: Isaac Newton

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<36r>

{to} Oldenburg

Feb. 19. 1676.

Sir

I received your letter conteining that of M^r^ Lucas & this afternoon another from your self by M^r^ White with the last Transactions, for which I thank you. [[1]The speculation of the figures of confining liquors. I am apt to think with M^r^ Boyll may by degrees administer very considerable thoughts to such as are contriving mechanical systems systems of Phy: but the last of the Phænomena, where an oyle lighter than spirit of wine poured on the Alcaly deliquated made a very specular superficies in their confine, being more in the way of things I have been som**{e}**times considering; I shal rather present you with what thoughts occur to me about that, presuming you will excuse my randome guesses] because it is by your desire that I write them.

[I imagin then that as spirit of wine, though lighter than water, is yet a more strongly refracting liquor; so the refractive density of this lighter oyle may be still greater, so as much to exceed that of the Alcalizate liquor. And if so then the propounded Phonomenon may keep analogy with that of other reflecting superficies. For the reflexive power of any superficies (so far as my observation reaches) is proportional to the difference of the refractive densities of bordering mediums. And (which I take to be the present case,) the same superficies reflects much more strongly on that side towards the denser (I mean the more strongly refractive) medium then on the opposite side. Besides when that side towards the denser Medium is viewed obliquely enough, it always reflects all the light to the eye as much as quicksilver does: & the greater the difference of the refractive density of the mediums is, the less obliquity is requisite to produce this phænomenon. This total reflexion holds in all positions of the eye. not less oblique then to a certain limit: & if the eye be held less oblique then at that limit, the reflexion grows very sensibly fainter on a sudden, & is faintest of all when the superficies is viewed perpendicularly. The mentioned limit, a skilful Optician, by knowing the refractive power of the liquors would easily assigne.

If the experiment were therefore to be tryed again it might not be amis to observe whither if the common superficies of the liquors be viewed by degrees less & less obliquely, the reflexion does <36v> not begin to grow faint at a certain position of the eye & from thence forward grow insensibly fainter & fainter till the eye be perpendicularly over the superficies. 2 Whether the lighter oyle be not more strongly refractive than the oyle of Tartar. 3 Whether the obliquity at which the reflexion begins to grow faint, be not such as a Mathematician would compute it by having the refractive powers of the two liquors given, that is, the ratios of their sines of incidence & refraction. 4: Whether if the light oyle be powred on some more strongly refracting liquor then the alcalizate one (such as butter of Antimony per deliquium (as I may call the solution of it made by exposing it to the air) may be) the common superficies be not less strongly reflexive then when the Alcalizate liquor or common water is used.]

The Phosophorus seems to me a very extraordinary thing, but I cannot yet deduce any thing from it. I am going out of town for a few days, & when I return I shall think of an answer to M^r^ Lucas, in the mean time I rest

Your humble servant

Is. Newton.

I would not have you write to me till you hear that I am returned. Excuse this hasty scribble.

Feb 19 1676

<37v>

For Henry Oldenburg Es□
at his house about the middle of the old Pal mail in

Westminster

2 London

Letters about Reflecting Telescopes, & Refraction.

[1] N. 131. p. 785. Exp. 13.