

A Serie's of Quere's propounded by Mr. Isaac Newton ... positively concluding his new Theory of Light and Colours

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A Serie's of Quere's propounded by Mr. Isaac Newton, to be determin'd by Experiments, positively and directly concluding his new Theory of Light and Colours; and here recommended to the Industry of the Lovers of Experimental Philosophy, as they were generously imparted to the Publisher in a Letter of the said Mr. Newtons of July 8. 1672.

IN the mean while give me leave, Sir, to insinuate, that I cannot think it effectual for determining truth, to examin the several waies by which Phænomena may be explained, unless where there can be a perfect enumeration of all those waies. You know, the proper Method for *inquiring* after the properties of things is, to deduce them from Experiments. And I told you, that the Theory, which I propounded, was evinced to me, not by inferring 'tis thus because not otherwise, that is, not by deducing it only from a confutation of contrary suppositions, but by deriving it from Experiments concluding positively and directly. The way therefore to examin it is, by considering, whether the Experiments which I propound do prove those parts of the Theory, to which they are applyed; or by prosecuting other Experiments which the Theory may suggest for its examination. And this I would have done in a due Method; the Laws of *Refraction* being throughly inquired into and determined before the nature of *Colours* be taken into consideration. It may not be amiss to proceed according to the *Series* of these *Quæries*; which I could wish were determined by the Event of proper Experiments; declared by those that may have the curiosity to examin them.

1. Whether rays, that are *alike* incident on the same *Medium*, have *unequal* refractions; and how great are the inequalities of their refractions at any incidence?

2. What is the Law according to which each ray is more or less refracted; whether it be that the same ray is ever refracted according to the same *ratio* of the sines of incidence and refraction; and divers rays, according to divers *ratio*'s; or that the refraction of each ray is greater or less without any certain rule? *That is*, whether each ray have a certain degree of refrangibility according to which its refraction is performed; or is refracted without that regularity?

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3. Whether rays, which are endued with particular degrees of refrangibility, when they are by any means separated, have particular colours constantly belonging to them; viz. the least refrangible, *Scarlet*; the most refrangible, *deep Violet*; the middle, *Sea-green*; and others, other colours? And on the contrary?

4. Whether the colour of any sort of rays apart may be changed by refraction?
5. Whether colours by coalescing do really change one another to produce a new colour, or produce it by mixing only?
6. Whether a due mixture of rays, indued with all variety of colours, produces Light perfectly like that of the Sun, and which hath all the same properties, and exhibits the same *Phænomena*?
7. Whether the component colours of each mixture be really changed; or be only separated when from that mixture various colours are produced again by Refraction?
8. Whether there be any other colours produced by refraction than such, as ought to result from the colours belonging to the diversly refrangible rays by their being separated or mixed by that refraction?

To determine by Experiments these and such like *Quære's* which involve the propounded Theory, seems the most proper and direct way to a conclusion. And therefore I could with all objections were suspended, taken from *Hypotheses* or any other heads than these two; Of shewing the insufficiency of Experiments to determine these *Quære's* or prove any other parts of my Theory, by assigning the flaws and defects in my conclusions drawn from them; Or of producing other Experiments which directly contradict me, if any such may seem to occur. For if the Experiments, which I urge, be defective, it cannot be difficult to show the defects; but if valid, then by proving the Theory they must render all Objections invalid.

So far this accurate Proposer; whose Method appearing to be most genuine and proper to the purpose it is propounded for, and deserving therefore to be considered and put to trial by Philosophers, abroad as well as at home; the Publisher, to invite and gratify Forraigners, was willing to deliver the above recited Extract of Mr. Newtons Letter in the language also of the Learned, as followeth;

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Excerptum ex Isaaci Newtoni Epistola, nuper ad Editorem script, quâ ipse genuinam suggerit Methodum, doctrinam suam de Luc & Coloribus, antehac propositam, evincendi, subjectâ certorum Quæditorum, debitis Experimentis solvendorum, serie.

L Iceat mihi hac occasione tibi significare, nequaquam censere me, efficacem eam esse determinandæ veritatis rationem, quâ diversi examinantur modi, quibus *Phænomena* explicari possunt, nisi ubi perfecta fuerit omnium istorum modorum Enumeratio. Nosti, genuinam proprietates rerum investigandi Methodum esse, quâ illæ ab Experimentis deducuntur. Ac jam antè tibi dixeram; Theoriam à me propositam evictam mihi fuisse, non quidem inferendo rem ita se habere quia haud se habeat aliter, i. e. non eam deducendo duntaxat à contrariarum suppositionum confutatione; sed ipsam ab Experimentis, positivè & directè concludentibus, derivando. Vera itaque ratio eam examinandi hæc erit, si consideremus scilicet, num Experimenta à me proposita illas Theoria partes, quibus accommodantur, reverà probent; vel si alia prosequamur Experimenta, qua ab ipsa Theroria ad examinandam eam suggerantur. Atque hoc ipsum Methodo genuinâ fieri velim; pervestigatis primum ac determinatis Legibus Refractionis, priusquam Colorum natura disquiratur. Præter rem itaque haud fore crediderim, disquisitionem hanc ex sequentium Quæditorum serie instituere; quæ quidem ut à solertibus sagacibusque naturæ Mystis, pronunciatis Experimentorum Eventibus, dirimantur, in votis quàm maximè habeo. Ea sunt;

Primò, Num radii, qui æquali incidentiâ in idem medium incidunt, Refractiones habeant inæquales; quantæque sint refractionum, quas illi subeunt, inæqualitates in quavis incidentia?

Secundò, Quænam ea Lex sit, juxta quam radius quilibet magis minúsve refringitur? sitnè, quòd idem radius semper refringatur secundùm eandem rationem Sinuum Incidentiæ & Refractionis; diversi autem radii, secundùm rationes diversus? An verò, quòd cujuslibet radii refractionis major minorve sit absque ulla regula certa? Hoc est, Utrum unusquisque radius certum habeat gradum Refrangibilitatis, juxta quem fiat ipsius refractionis; an verò refringatur sine ista regularitate?

Tertiò, Num radii, certis gradibus refrangibilitatis præditi, quando, quodcumque modo, discernuntur, certos obtineant colores ipsi proprios; puta radii minimè omnium refrangibiles, Coccineum; maxime

refrangibiles, saturum Violaceum; intermedii, sub-Viridem; alii, alios? Et è contrà.

Quartò, Num color cujusvis generis radiorum seorsim existentium mutari possint Refractione?

Quintò, Utrum colores coalescendo reverà se invicem mutant ad producendum colorem novum; an verò eum producant nonnisi se invicem commiscendo?

Sextò, Num debita radiorum miscela, omnigenâ colorum varietate prædita, Lucem producat Solari luci simillimam; quæque easdem omninò proprietates obtineat, eademque Phænomena exhibeat?

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Septimò, Utrum componentes cujusvis miscela colores reverê mutantur; an verò secernantur duntaxat, quando ex mixtura illa varii colores rursum producuntur per Refractionem?

Octavò, Denturne ulli alii colores Refractione producti præter eos, quos oriri oportet à Coloribus, ad radios diversimodè refrangibiles pertinentibus, dum illi refractione istâ secernuntur vel miscentur?

Per Experimenta determinare hæc similiave Quæsita, quæ propositam Theoriam involvunt, maximè genuina directaque videtur ad Conclusionem via: Proindèque omnes velim Objectiones suspendi, quæ ab Hypothesibus desumuntur ullisve Fontibus aliis, quàm his duobus; quibus nempe vel ostendatur Experimentorum ad determinanda hæc ζητήματα probandasve ullas alias Theoriæ meæ partes insufficientia, hallucinationes defectusque in Conclusionibus meis inde deductis indigitando; vel alia producantur Experimenta, é diametro mihi opposita, si quæ talia occurrere videantur. Si enim Experimenta, quæ á me urgentur, laborant defectibus, difficile haud fuerit eos ostendere; si verò valida fuerint, eo ipso dum Theoriam meam asserunt probantque omnes Objectiones convellunt.
