Letter from Newton to a friend, together with Collins's description of a telescope mentioned in the Newton letter

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Sir

I promised in a Letter to M^{r} Ent to give you an accompt of my Successe in a small attempt I had then in hand, And it is this; being perswaded of a certaine way whereby the Practicall part of Opticks might be promoted I thought it best to proceed by degrees and make a Small Prospective first to try whether my coniecture would hold good or not, The Instrument that I made is but Six Inches in Length, it beares something more then an Inch apperture, and a Plano=convex eye glas**{**se**}** whose depth is $\frac{1}{6}$ or $\frac{1}{7}^{\text{th}}$ part of an Inch, Soe that it Magnifies about 40 times in Diameter which is more then any 6 foote Tube can doe I beleeve with distinctnesse. But by reason of bad Materialls and for want of Good Pollish it represents not things so distinct as a 6 . foote Tube will doe, yet I thinke it will discover as much as any 3 . or 4 . foote Tube especially if the Objects be Luminous; I have seen with it Iupiter distinctly round and his Satellites, and Venus horned. Thus Sir I have given you a short accompt of this small Instrument, which though in it selfe contemptible may yet be looked upon as an Epitome of what may be done according to this way, for I doubt not but in time a Six foote Tube may be made after this Method which will Performe as much as any 60 . or 100 . foote Tube made after the Common way; Whereas I am Perswaded that were a Tube made after the Common way of the Purest Glasse, exquisitly Pollished with the best figure that any Geometrician (Des=Cartes &c) hath or can designe (which I beleive is all that men have hitherto attempted or wished for) yet such a Tube would scarce performe as much more as an ordinary good Tube of the same length; And this however it may seeme a Paradoxicall assertion, yet it is the Necessary consequence of some Experiments which I have made concerning the Nature of Light.

The above is Coppy of a Letter written by M^{r} Newton to a freind of his

The Tellescope therein mentioned hath been lately sent up to the Royall Societie, who gave M^{r} Cox order to make one after the same manner of Contrivance 4 foot long the which hath been done: one end of the tube is open, at the other end is placed a Concave Mettalline Mirrour, the Diameter whereof is betwixt 4 and 5 Inches it was ground on a Sphære of 14 foot Diameter and about its focus which is about 4 foot off is placed a reflecting Plate as big as a two pence inclined at an <3v> angle of 45 degrees to the Axis, so that the reflected

Rayes falling thereon, are againe reflected upright to the side of the Tellescope, where the eye through a small hole wherein is placed a small Plano Convex glasse beholds the Object on the reflecting Plate, as much magnified as it could have been done by an ordinary Tellescope of 40 foote long or more, and voyd of Colours: the Mirrour and reflecting Plate are made to be taken out, and wiped at pleasure: they are not yet pleased with the Mettall or Polish of the reflecting Plate, but are trying Lapis Osmandinus, a black Stone that comes from Mount Hecla in Island, and other Materialls whereof you may afterwards heare the Successe

M^{r} Hooke,[1] seeing this Tellescope to obtaine esteeme, about a Month since put in a Proposall in Writing to the Royall Societie in words to this effect

The perfection of Tellescopes, Microscopes, Scotoscopes, and burning Glasses, by figures, as easily made, as those that are plaine, or Sphærericall, whereby the Light and Magnitude of Objects is prodigiously encreased and whatsoever hath hitherto been attempted or almost desired in Dioptricks accomplished, With a Cipher containing the Mysterie the which he disclosed to the Lord Brouncker, and D^{r} Wren, who report plausibly of it, and what is done in this way is performed by Glasse Refraction

M^{r} Hooke moreover affirmed coram multis that in the yeare 1664 he made a little Tube of about an Inch long, to put in his fobb, which performes more than any Tellescope of 50 foot long made after the common manner; but the Plague happening, which caused his absence, and the fire, whence redounded profitable employments about the Citty, he neglected to prosecute the same, being unwilling the Glasse grinders should know any thing of the Secret, Gottignies the Scholar of Gregory of St Vincent, whose remaines he hath, is said to have made wonderfull (but in what respect I know not) Tellescopes at Rome, and to have published a Treatise of Dioptricks there.

Another usefull Instrument lately invented here, is Sir Samuell Morelands loud speaking Trumpett, of which he hath written a Booke or history with the title of Tuba Stentorophonica value one shilling, by which persons may discourse at about a Mile and a halfes distance, if not more

John Collins

[1] Hookes Tellescopes