Letter from Newton to Henry Oldenburg, dated 6 January 1671/2

Author: Isaac Newton

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Cambridg. Jan. 6. $167\frac{1}{2}$.

Sir

At the reading of your letter I was surprised to see so much care taken about securing an invention to mee, of which I have hitherto had so little value. And therefore since the Royal Society is pleased to think it worth the patronizing, I must acknowledg it deserves much more of them for that, then of mee, who, had not the communication of it been desired, might have let it still remained in private as it hath already done some yeares.

—[The description of the instrument you sent mee is very well, onely the radius of the concave metall which you put 14 inches is more justly $12\frac{2}{3}$ or 13^{inches}, & the radius of the eye glasse which you put half an inch is the twelft part of it, if not lesse. For the metall collects the suns rays at $6\frac{1}{3}$ inches distance, & the eye glass at lesse then $\frac{1}{6}{}^{\text{t}}$ part of an inch distance from its vertex. By the tooles also to which they were ground I know their dimensions, & particularly measuring the diameter of the hemisphæricall concave in which the eye glasse was ground I find it the 6^{t} part of an inch.

Perhaps it may give some satisfaction to Mounsieur Hugens to understand in what degree it represents things distinct & free from colours, & to know the aperture by which it admits light. And after the words [— versus focum E reflectatur.] it may not bee amiss to add this note

Conferendo distantias foci istius a verticibus Lentis et speculi concavi, hoc est EF $\frac{1}{6}{}^{\text{dig}}$ et ETU $6\frac{1}{3}{}^{\text{dig}}$, prodit ratio 1 ad 38, qua indicatur objecta 38 vicibus circiter ampliari.

And to this proportion is very consentaneous the observation of the crowns on the weathercock. For the scheme represents it bigger by $2\frac{1}{2}$ times when seene through this, then when through an ordinary perspective. And so supposing that to magnify 13 or 14 times, as by the description it should, this by the experiment proportionably must magnify almost as much as I have assigned it. —

To the objection that with it objects are difficultly found, I may answer that that's the inconvenience of all Tubes that magnify much, & that after a little use the inconvenience will grow lesse, For I could readily enough find any day objects by knowing which way they were posited from other objects that I accidentally saw in it; but in the night to find starrs I confesse is troublesom enough. Yet this may bee easily remedyed by two sights affixed to the iron rodd by which the tube is susteined. And such I once intended should have

beene made before I sent it away from mee, but that I thought the defect would not bee judged materiall. If such sights bee not found a sufficient remedy, there may bee an ordinary perspective glasse fastened to the same frame with the tube, & directed towards the same object, as DesCartes in his Dioptricks hath described for remedying the same inconvenience of his best telescopes.

The plane side of the eye glasse is apt to bee soiled with dust falling upon it. And therefore the little leaden ring put into the orifice of the bigger leaden barrell to moderate its aperture must bee sometimes taken out, & the glass wiped with leather done upon the small end of a stick, or other such like contrivance, but care must bee taken that the said ring bee not lost, for without it objects appeare very confused at the edges of the apparent space. So if the concave metall contract any dullnesse by moysture or otherwise, it ought to bee taken out and rubbed with gentle leather, but not with putty or any thing that may weare the metall.

I am very sensible of the honour done me by the Bishop of Sarum in proposing mee < insertion from the left margin > Candidate & which I hope will bee further conferred upon mee by my Election into the Society. And if so, I shall endeavour to testify my gratitude by communicating what my poore & solitary endeavours can effect towards the promoting your Philosophicall designes. Sir I am

Your very humble servant

I. Newton.

< text from f 12r resumes >