

*Christiani Hugenii Astroscopia compendiaria, Tubi optici molimine liberata. Or the description of an Aerial Telescope.*

**T**He use of *Telescopes* being so necessary for *Astronomy* it hath been the endeavour of several lovers of that science to find out some more convenient and easier way, for the handling of the same. Then whereas all the perfection that hitherto hath been added to *Telescopes*, chiefly consisteth, in making them very long and the glasses of a bigger sphere, the same length and bigness thus increased, hath been stifled by a troublesome heaviness and disproportion to manage and direct them to the Stars. The Author hence, to take off the incumbrance, hath found out a devise in cutting or leaving out almost the whole tube, saving only a small part of it near the objective glass, and somewhat towards the Eye glass, ordering these two extremities in such a manner, that they may do the same service, as if the whole tube of one piece should be employed. To this purpose he explaineth himself by a scheme and clear description, how a mast must first be perpendicularly fixed into the ground, which for his own use he tells, was made of 50 foot long, serving for a *Telescope* of 70 foot, then joyning two parallel rules all along this mast, he declareth how by this means the objective glass may be easily drawn up and downwards by the help of a string or cord, applied to an equilibrated weight, so that it be correspondent to the Eye glass. The circumstances whereof can be read in his printed paper, where also the full structure is to be seen. Only to come to the objection which the Author proposeth himself, against the use of this curtailed *Telescope*. The *First*, is the fickleness in keeping alwayes the *Eyeglass* in the same posture: to remedy this, he describeth a two legged instrument to be put under the 2 arms, to hold them up the more steadily. *Secondly*, it seemeth to be a hard matter, to find out at night time in such a distance the objective glass or the Stars you look for, the cord alone not being able to direct the whole business: to help this inconveniency, he saith, one must make use of a lantern, which being in the same manner as commonly used for the projection of images, and dispersion of light, will give direction for the finding the objective glass, by inlightning the same for  
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to make a due agreement with that other glafs. But as to obferve the Moon, there needs nothing of this, when the glafs eafily may be difcovered by the Moon light it felf. *Thirdly*, it is very difficult to find (in fuch a length of a Tube of 100 or 200 foot) the true parallelifm of the two glaffes, the ftring being bended in the middle, and alfo not fit to give a true or ftrait direction. To this he answereth 1. that there is no need of fuch a geometrical perfection of parallelifm, but that the fame may have fome latitude. 2. The ftring being of a finall weight, and only a filk thred, which 50 foot long doth fcarce amount to halfe a drachm, and yet able to hold 7 of weight, this bending of the ftring will caufe only a fmall error, for to find how much the bending maketh it decline, if it is fupposed to be a parabolical line in the curvature, the angle of deflection by the tangent will come to 24 minuts which in 150 foot diftance produceth an error of one foot, that the Eye will be out of her true way of direction. But to remedy all this, he fheweth how by the help of the Lanterne fuch miftakes may be corrected. *Fourthly*, the conftitution of the air, as being windie, or tempeftuous will make a great hindrance, for the ftring or cord will be altered and drawn at one or the other fide. To prevent this, there is no remedy: the common fort of Telescopes being fubject to the fame troubles. Yea fometimes, when the air is very quiet and the Sky clear, yet the ftars much glittering, the Telescopes will not ferve, alfo the vapours fometimes will ftick to the glafs. *Fifthly*, againft the lantern before mentioned, one might object that at a diftance of 200 and more foot, the light projected would be very weak, and not well to be difcerned: but to make it brighter, a greater lantern muft be got and a bigger wick put in and other things ordered accordingly. *Sixthly*, if it fhould be too troublefome to, to fix fuch a long maft of a 100 and more foot, the Author fheweth how the compofition of mafts joyning one to another may be continued as far as neceffity fhall require. Yet for all that, he thinks, there will be no need to make thefe mafts of fuch a vaft height: for no body will bring the Telescopes to fuch a perfection as to make appear any animal or creature in the Moon or Planets.

Beaufe, firft, there is fuch a difficulty in making the glaffes, for the bigger they are, the more art is required in performing them. 2. There is fcarce any piece of glafs to be found fit for fuch a large bufinefs, being peftered with many faults. 3. The amplification of the things feen by Telescopes being regulated by the bignefs of the aperture that the

The objective glafs will be in fomuch that the apertures are in a fubduple reafon to the lengths, it followeth that a Teleftcope of 30 foot requiring an aperture of 3 inches, to another of 300 foot, that will bear no more then 9 inches and a half, is as 1 to 3. that is, will magnify but 3 times as much, but if it fhould make 10 times as big, it would require a length of 3000 foot, which he thinketh not to be practicable. 4<sup>th</sup>. There are ftill fome irregularities in the nature of refractions, as is proved by Mr. *Newton's* experiments of colour, yet as far as is known, the faid reafon of the apertures to the lengths is thereby confirmed. Finally, for the better ufe of this Teleftcope, he giveth an admonition, that to obferve the Satellites of Saturn found out by *Caffinus*, it is convenient to look through a narrow aperture, to exclude the light that cometh from the fides, and to refrain the apple of the Eye, which in the dark ufe to be very large and open.

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