A Letter from William Molyneux *Esq*; Sec. *of the* Dublin Society ; *to one of the* S. *of the* R. S. *concerning a new* Hygroscope, *invented by Him.*

Dublin *April*, 17. 1685.

Sir,

FOR want of some thing better to send you, I shall briefly declare to you the contrivance of a *Hygroscope*, which I have lately invented and put in execution with good success. I do not know that any one has mentioned, or so much as hinted at the like, and therefore to me 'tis altogether New; but if any one has been before-hand with me, I shall not in the least contend for the Glory of it.

Fig. 2. *AB.* is a Whipcord about four foot long, tyed fast to the end of the Hook *A.* At the end of this Whipcord there hangs the Weight *C.* about a pound or something more; this weight is so fitted at the end as to receive and carry the Index *D.* under these there is placed a Graduated Cirle on the Board *EF.* Fixt by a Bragget against the Wall.

All things being thus adapted, the moisture of the *Air* twists the Rope and gives a motion to the Index over the divisions in the Graduated Circle; and again as the *Air* grows more dry, the Cord untwists and brings back the Index by a contrary motion.

That which first gave me the Hint of this, was the observing all Ropes tyed at both ends to be much more tite & stretched harder after Rain has fallen on them then before; I concluded that if I could (as it were,) ty a Rope at both ends and yet give one end a liberty of Circumvolution; it would perform my desired end; now the Weight

Weight *C* hung at the Rope does this, for it fixes (as it were,) the end of the Rope *B*, and yet it permits it to twiſt and untwiſt. And the reaſon of this twiſting and untwiſting is plain; for the little particles of moiſture inſinuating and ſoaking into the Cord are like ſo many Wedges, which muſt needs ſhorten the Rope, as a Bladder is ſhortned by being blown up, and will lift a great weight (as Dr. *Wallis* diſcourſes at large in his *Mechanicks*,) but the eaſieſt way for the Rope *AB*. to ſhorten and lift up the weight *C*. is to do it by way of ſcrew; for it ſelf is a ſcrew, the ſtrands thereof being twiſted (and each particular thread in it,) ſcrew-wiſe, and conſequently muſt give a circular motion to the Index.

To make an experiment of this, I wetted a Cord and hung it up with the Weight at the end of it, and I perceived as it dryd it untwiſted, and that too very quick, ſo as to be perceived by the Ey; after the Cord had ſo far untwiſted, as I thought it had come to that degree of dryneſs, that the preſent Conſtitution of the *Air* would permit, I took a baſon of warm water that ſent out a Steam and Fume, and placed it under the Cord; immediatly the Cord began again to twiſt very quick, and ſo continued till the Water ceaſed Fuming, or was removed, and then immediately it began to return its twiſts. I then tryed to breath upon it gently with my breath, and found according to my expectation, that 8 or 10 breathings would twiſt it 5 degrees of a Circle. I then permitted it to the *Air* only, and for theſe laſt three weeks have obſerv'd its motion as affected by the Moiſture and Drought thereof, and I find it to obey the alterations thereof moſt nicely; there falls not the leaſt ſhower, at which it dos not preſently twiſt; and when by riſing Clouds a fair day becomes overſhadow'd, the Cord is immediately ſenſible thereof, and again as ſenſible of their Vaniſhing and alteration to fair Sun-ſhine. So that I have ſeen it ſhew alteration, when not the leaſt could

be collected from the ſweating of Stones, cracking of Wainſcote, &c. So that indeed I repute it to be the niceſt *Hygrometer*, that has ever yet been uſed, and I am ſure is as cheap and plain as any.

One of the grand defects of moſt (indeed I think of all,) *Hygrometers* hitherto invented is, that they grow weak with age, and do not ſo nicely obey the alterations of the *Air*, when long kept, as when firſt made; Planks and Boards grow more ſeaſoned, and I beleive Oat-Beards will periſh with time; but whether our preſent Invention be ſubject to the ſame fault, I leave to time to determine; in the mean while, give me leave to propoſe a reaſon which induces me to conjecture probably it will not have this defect; for our Cord performs its motion as it is a plyable ſoft ſcrew, and that not only in its groſſer part or ſtrands, but even in its ſmalleſt threads; as long as ever this contexture ſcrew-wiſe dos laſt (and this certainly muſt laſt whilſt 'tis a Rope,) the motion that reſults therefrom muſt neceſſarily laſt, for the particles of moiſture will inſinuate themſelves, and twiſt up the ſcrew. But this I offer only as a conjecture, for I love to conclude nothing in natural Philoſophy, till matter of fact and experiment confirm it.

There remains one thing to be obſerved of this *Hygroſcope* (or *Weatherclock*; as an eaſier name to ſatisfy Ladys, that enquire what it is, as it hangs up in a Room,) that which I have deſcribed I have in my Cloſet, and I obſerve that the alterations of the *Air* that have happened in this time have given it more then one turn; now this being inconvenient, and the Duplication of the turn hard to be regiſtred, as Mr, *Hook* propoſes in his *Micrography* pag. 150. concerning the beard of a wild-Oat; I have thought of a way for remedying this, for it being in our power to increaſe the Diameter of our graduated Circle as large as we pleaſe, what need have we of more then one turn from the greateſt degree of moiſ-

ture

ture to the greateſt degree of Drought? Now ſuppoſe I find the *Hygroſcope* repreſented in the *Figure* to have two compleat Revolutions (this is to be found by obſervation throughout a whole year,) I ſay then the way of rectifying it is thus.

In *Fig.* 2 the Index *D.* has two Compleat turns; the point *A.* as being fixt has no turn or motion, therefore the middle point *G.* has but one turn, and conſequently if I hang it up at the point *G.* or no longer then *G D.* half the former length, the Index *D.* will have but one turn. What is here ſaid of two turns and the middle point *G.* may be accommodated to any other number of turns and parts, and points in the Rope,

Laſtly, *Sir*, we may in this experiment perceive ſome thing that may help us in the conſideration of the ſtrength and motion of the Muſcles of Animals; for take a Cord able to ſuſtain an Hundred pound weight, by the weak Fume or Steam of warm water this weight ſhall be lifted up; for if this Steam turn the weight (as moſt certainly it will do, if the Rope be of any moderate length,) the weight is as certainly lifted up thereby as by a ſcrew, as is evident to any one that conſiders it. If therefore ſuch mighty performances can be produced by the application of ſuch mean agents, as we all know and are converſant with, what ſhall we think is too great for thoſe parts which *God* has contrived and framed in the Bodys of Animals?

I am

Your moſt Humble ſervant

WILLIAM MOLYNEUX.

P. S. I forgot to mention one particular, that is, apply a Candle or Heated Iron nigh the Rope and it makes it twiſt very quick, contrary to Mr. *Hooks* Oat-beard.

Philosoph: Transact: Numb: 172.

Fig. 1.

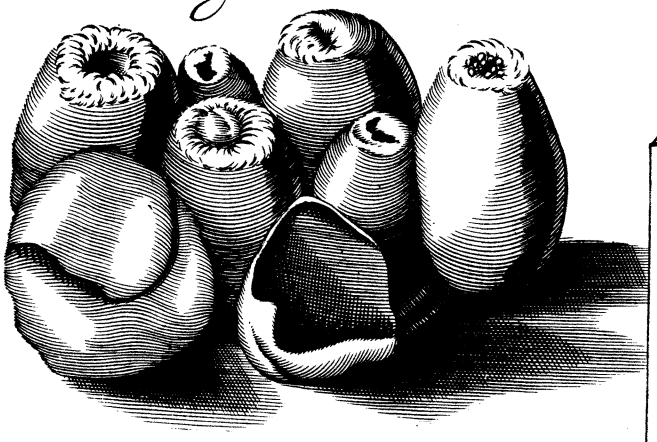

Fig. 2.

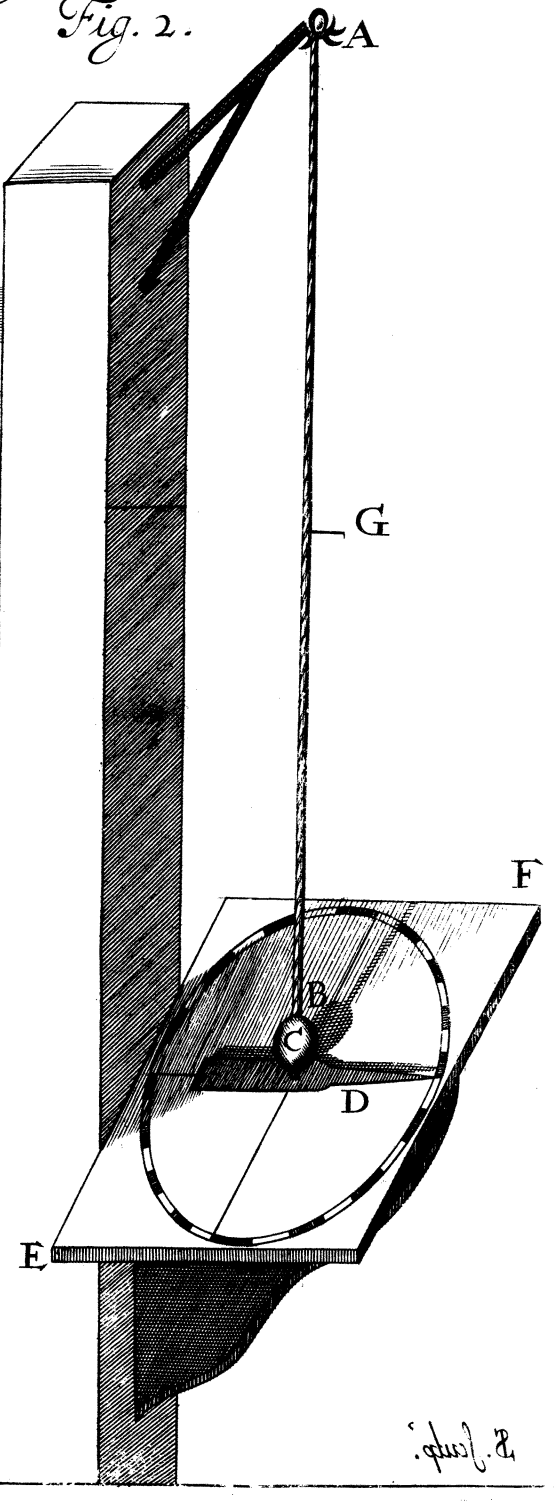

Fig. 3.