

yields to the Hair ; if it be too hard, the Hair causes a great many Notches in it, and especially when the Razor meets with a stiff rugged Hair, that was not sufficiently suppled with Water. However it be, I never yet saw a Razor without some Notches.

III. *Part of a Letter from Mr Anthony van Leeuwenhoek, F. R. S. to the Pablisber, concerning several Microscopical observations.*

Delft in Holland, June 21, 1701.

IN the Account of Books for the Months of *March* and *April* for this present year, I met with a Book whose Title in *English* runs thus: *Historical and Philological Miscellanies, collected by Mr Vigneuil-Marville, the 2d part printed at Rotterdam for Elias Yvans, 1700.* Wherein, p. 276. he that gives the Account of Books says thus : The Author in the 407th page of his Book tells us what a wonderful Magnifying Gläs he met with at a *Virtuoso's* in *London*, whose Excellencies will seem Incredible to most that hear them ; and yet he Instances in some Particulars of his own Observations, and pretends that he can thereby discover the Atoms of *Epicurus*, the *Materia Subtilis* of *Descartes*, the Exhalations of the Earth, the Perpirations of Bodies, and the Influences of the Stars.]

The man seems by his Writings to be a Papist.

This Relation seems to me wholly Paradoxical, and I do earnestly intreat you, Sir, to tell me whither you know any thing of these wonderful Sights, for I could never be perswaded that we can penetrate so far into the Secrets of Nature ; and therefore I rather think it to be a Fable than Truth.

Now

Now we are upon this head, I can't help giving you an Account of something I have observed relating thereto.

About 3 years ago I was in another Town, where they shew'd me a Magnifying Glass, whose chiefest Excellency was, that one could see an object a great distance from the said Glass. As soon as ever I had put the Glass to my eye, I concluded that there was a hole or cavity in it, by which the remote object came to be seen; for when I came to view the Glass by one of my own which I had about me, I did not only discover one deep Pit or Cavity in it, but several other lesser, which had not been ground out; so that upon the whole it seem'd a very inconsiderable Glass.

Last Winter came to me a Fellow, whose business it is to grind Glasses, and bragg'd mightily of a Magnifying Glass that he had, whereby he could see into Metals and Minerals.

I laugh'd at what he said, and made answer, that the Pores of Metals were so close and impervious, that it was impossible ever to see through them; and that Lead-Gold, tho' never so thin beat, would teach us that.

He intreated me but to give him a minutes time, and he did not doubt but to make good his Assertion; hereupon he put his Glass into my hands, adding, that I should see the light of the Candle through a Copper Circle which stood before the Magnifying-Glass, and accordingly I saw a very imperfect light through the Copper Circle.

Hereupon I told him that this was nothing; that he might cheat the Ignorant, but must not think to impose upon me; and that this Phenomenon was only occasion'd by a small part of the Glass that was not ground; and then I took an extraordinary Glass, which immediately discovered those parts that were not ground, and shewing my Goldsmen the same, he was quite amazed, and so I dismiss'd him.

It has often happen'd that in the bursting of Glafs, or of Sparks flying out of Wood-coals (my eye being a little too near) small particles of the Glafs or Fire came into my Eye, and caus'd it to smart, upon which I us'd to arm my Eyes with Spectacles, against the like Accidents for the future.

Now I observe when I look thro one of my Glaffes by Candle light, that near the upper part of my Eye in the *Tunica cornea*, there appears a fine small Flame of a Candle inverted, no bigger than the common Letters we use in writing, and opposite to it appear two round clear lights, so very small that the Flame of the Candle is not to be perceived therein.

From hence I conclude, that the *Tunica Cornea* of the Eye, by the wound it received from those particles of Glafs, has lost something of its roundness, which occasion'd those Appearances, and that when the wounded part stood just before the sight it obstructed it, &c.

I observ'd also, that in several places of the *Tunica Cornea*, there lay Veins no longer than the Breadth of 2 or 3 Hairs put together, wherein I could perceive the Globules of Blood very distinctly; these Vessels were so small, that they could contain but one Globule in the Diameter of them, and the Blood had no manner of Motion.

The Vessels seem to me to be broken off from other Blood-vessels, and when the Particles of Blood are a little crowded together, or when one of those longish Vessels are somewhat bended, it appears to the sight, as if one saw a thick Cloud.

With this Cloud of small particles, the eyes are surrounded but more one time than another, for some are dispers'd, and then others arise in their places; when we view these Vessels with their Globules of Blood, thro one of my Glaffes against a Candle or other strong light, they seem

feem to be in a continual Motion, whereby those Particles that are in the *Tunica Cornea*, be their Motion never so small, seem to us, as if they were moving in the air, but by strict examination we shall find, that they are one and the same Particles, which sometime appear Ascending, and at other times Descending.

Besides the aforementioned Blood Vessels, we find in the *Tunica Cornea* round Particles that lye scatter'd about, which Particles I judge to be Globules of Blood; an ignorant person seeing these Particles in continual Motion, for as I said before, sometimes they appear Ascending, and sometimes Descending, would be apt to say, that these Particles were not in his Eye, but in the air before the Glass; and perhaps too, that the descending particles were the Influxes of the Star, and those that seem'd Ascending the exhalations of the Earth, or other Bodies.

It has often befallen too, when I lookt against a strong light, thro my Microscopes, that I saw an infinite number of exceeding small Particles, that had all a glittering Motion.

I never imagined that these Particles were in the Air, as others would, but rather that they were in the Christialine humor of the Eye between the *Tunica Cornea* and the *Cristalina*, the motion of which small Particles is occasioned by pressing the *Tunica Cornea*, when we shut our Eye close together.

But how is it possible to conceive, that the Influences of Stars can arrive to our sight, by the means of magnifying Glasses, especially if we believe, with that great Astronomer, *Christian Huygens*, Lord of *Zuylichem* (while he lived my great Friend) that the distance of the nearest fixt Star from the Sun is so very great, that if a Cannon Bullet were shot from the Sun to the fixt Star, it would be seven hundred thousand years in motion before it arrived.

In short, Sir, I can't imagine how men dare not only to invent such ridiculous Stories, but also publish the same in Print, in order to amuse weak heads with an account of such wonderful Glasses. For if the Perspirations of our Bodies could be seen by such Glasses, what discoveries might be made in the Animalcula in *Semine Masculino*, for whereas I can only now with the most exact observations, discover the tails of the Animalcula in the Male Seed of Fishes, if I had such a Glass, I fancy I should see their tails so large and so thick, that I should easily perceive the several joynts in each tail, and the infinite Muscles in every Joynt, for such without doubt there are in all Bodies.

As for me, I have often taken several sorts of moist Matters, and laid them on a Glass clean as could possibly be made, and viewed them, as also the breathings of my mouth; and by the help of my Microscopes, I could see their fine subtle parts rising up from the Glass like clouds, and at last quite vanish, so that I could not perceive the least remnant of them; and finally, I am absolutely of opinion, that tho I could see the Effluvia of Bodies, that were a thousand Millions of times smaller than those, yet I should not be able to perceive the Perspirations of Bodies, and much less the imaginary influences of the Stars.

My most humble intreaty is, that if you can get any information of these famous, but unconceivable Glasses, you would please to transmit me an account thereof, and in so doing you would most highly oblige,

Sir

Your most humble Servant,

Antony van Leeuwenhoek.