

II. *A Letter from Mr Antony van Leeuwenhoek, F. R. S. to Mr Chamberlaine, concerning the causes of the different tastes of Waters and edge of Razors.*

Delft in Holland, June 21, 1701.

Worthy Sir,

I Have received your obliging Letter, of the 13th of April, 1701. wherein you desire to know, Whither I had ever made any observations of *Boyl'd Water*; which (say you) according as it is more or less boyl'd, does alter its Taste; and that you did first take notice thereof in Holland, where you studied some time, and where they chiefly make use of Rain water, especially in drinking Tea, &c. That you found a mighty difference in the same Water boyled a quarter of an hour (for example) or half an hour; which (you continue) without doubt must proceed from the Different Form of the Spirits or Salts in the Water, and that the Difference of their Figure is certainly the Cause of the Difference of their Taste, otherwise all Waters would taste alike, &c.

In answer to this I must tell you, Sir, that I have frequently observ'd Rain-water, but it never came into my head to try whether there were any difference in the Salts of Water that had been Boyled little or much, tho I have several times been oblig'd to drink Tea (and oftner indeed than I did desire) the Water of which had not been sufficiently boyl'd; especially because it is my Custom to drink Tea always after Dinner.

I make them boyl my Tea-water at least a quarter of an hour, which I judge sufficient to take off the Rawness (so we call the unpleasant Taste of the Water when it is not

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enough

enough Boyl'd) but in the Winter, when the Snow is melted, it must boyl longer to make it agreeable.

When my People doubt whither the Water be sufficiently boyled, they Taste it before they put it into the Tea-pot ; they can guess too pretty well by the Smell of the Water whether or no it be enough.

As we do with our Tea-water, so we do also with Coffee-water, tho in drinking Coffee I could never judge whither the Water was sufficiently boyled.

Now to satisfie you, Sir, as far as lies in my power ; I took a Drop of Rain-water that was well boyl'd, and which I found to be so when I drank the Tea that was infused into it.

This Water was fully boyl'd in a tinn'd Water Kettle, which had a good Cover upon it, so as no Smoak could get in, and was only used by me for that purpose.

This Water being mostly exhale'd, there remain'd abundance of little Salt Particles of an oblong Quadrangular Figure, whose Thickness was almost equal to their Breadth, and the upper parts of many of them were pointed like ground and Pointed Crystal ; but when I view'd them more narrowly, I perceiv'd that from every Angle there was a Point standing out.

Figure the 1. A and B represent two of these Salt Particles, in which I could perceive none of those points, that are plainly to be seen in Fig. 2. between C D and E, and whereof there were a great many which were otherwise very like Fig. 1. A B.

Then I took some Rain-water, that was but just upon Boyling, so that I could see a great many Air-bubbles rising from the bottom of the Kettle.

After I had exhale'd this Water also, I discover'd abundance of the aforesaid Salt Particles, and in as large a quantity as in the other Water that had been well boyled ; but besides them there were a few Salt Particles, in shape like Fig. 3. F G and H, of which latter sort I could dif-

discover none in the Water that was boyl'd enough ; from whence I concluded, that those Salt Particles which give the unboyl'd Water an unpleasant Taste, might very probably be those which we call the Volatile Salts, which by a great deal of Boyling, are, if I may so speak, dislodged, or evaporated out of the Water.

You were likewise pleas'd to ask my opinion, Sir, *about the Edge of Razors, which being made of pure Steel, the Configuration of its parts (you say) must needs be very strange ; so that it is equally spoyl'd with too great Heat or too great Cold ; in either case it is unfit to shave with ; and you cannot guess at the Reasons of it, &c.*

To this I answer, Sir, that I have several times consider'd the Edge of Razors ; the more, because I have had five Razors for several years, which I set for my own use upon a Hone, and keep them sharp enough ; only there is one among them which I have not used a long time, because it is hard and full of Notches.

This Razor I shew'd to a Fellow who goes about grinding them, and was formerly a Razor maker, who feeling the edge, did believe he could cure it ; adding, that he would grind it without Water, and thereby bring it to such a Heat, that it should be softer, and better Temper'd.

Tho this Razor cuts pretty well, and I can use it in shaving, yet it is so full of Notches, and some that are very large, that one would wonder how it can cut a Hair without causing Pain and Smart.

To satisfy myself further in this matter, I order'd the aforesaid person to bring me five new *English* Razors, that had never been used, and wherein he pretended I should not find one Notch. I view'd them with my Microscopes, and found abundance of small Notches in them, and some pretty large about the Point of the Razors ; and in one of them close to the Edge I observ'd a little hole that I could see thro, so that if the Razors had not been very

clean, and laid in Oyl, I should have imagin'd that Rust had been the cause thereof.

Out of those five Razors I chose one, which seem'd to me to have the fewest Notches, and with that I caus'd my self to be shaved ; at first it was very soft and easie, but at last it grew so painful that I could not endure it.

Having done this, I again view'd the Razor, and found in it many more Notches than when I first us'd it.

I took one of my own Razors, which I did not much value, and had us'd it but very little since it had been ground ; I observ'd the Back of it to be pretty rusty, but the Edge little or nothing. I scrap'd the Rust off, and ground the Razor with a Whetstone, in order to get off the Rusty part about the Edge ; then I pass'd it over a soft Stone with Water, that I might grind out those small Notches, which the first Stone had left, and to make the Edge the better. I pass'd it once or twice more thro Oyl, after which I lookt upon it thro my Glasse, and observ'd that in six several places close to the Edge there were little holes that went quite thro ; and tho with the naked Eye one could perceive but a very little Rust, and that only in one place, yet I could see very plainly with my Microscopes that all those little holes were full of Rust, and that that Rust had eaten thro the Razor.

I wash'd the back of my Hand with plain Water, and then took the said Razor, and scrap'd off the small Hairs with it ; then observing the Razor again, I could perceive that those little Holes were turn'd to Notches, and that small pieces of the Razor were broken out.

A certain Surgeon show'd me several Razors, and amongst them one that was ground in another Town, and had never been us'd after the grinding ; in that Razor I could perceive several Notches, and yet more in another that he us'd, and reckon'd a very good one.

In short, Sir, (and to return to your Question) my opinion is, that if the Metal of the Razor be too soft, it
yields

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 Glafs 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

fig: 2:

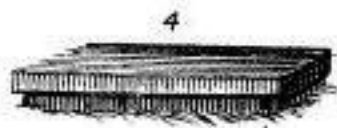


fig: 1:



fig: 3:

