

I. *A Letter from Mr. Anthony van Leeuwenhoek, F. R. S. containing his Observations upon the White Matter on the Tongues of Feverish Persons, &c.*

Delft, June 1708. N. S.

*Honourable Gentlemen,*

**S**INCE my last Observations concerning the Matter that was found upon the Tongues of Feverish Persons; as also on the protuberant Parts on the Tongues of Oxen, Cows and Hogs, which I have communicated some time since to your Honours; I take the liberty to lay before you the following Remarks. In the latter end of the Month of *April* last, I was again attack'd by a violent Fever, which lasted with me four Days, and was every Night accompany'd with an encreasing: And forasmuch as my Tongue was again cover'd with a thick whitish Matter, I took a Penknife, and sometimes a Silver Tongue Scraper, wherewith I scraped off the whitish Matter, which seem'd to be very strongly united to the Particles of the Tongue, and view'd the same thro' a Microscope divers times; but could discover nothing more than I have already mentioned in my former Observations on that Subject; saving only that I cou'd not now perceive so many of those brancht Particles, as I did formerly; which perhaps might proceed from my past Fever's being more violent than this.

I took twice some of the aforesaid Matter off my Tongue, and put it into a clean China Coffee-dish, and pour'd upon it boyling Rain-water, and moreover caus'd it to boil half an hour in the said Water; to the Intent that the viscous or slimy Matter, which did, as it were, glew the Particles together, might thereby be separated, and so I might the better observe them.

And altho' the said Matter of the Tongue was well boil'd, and had lain in the Water some days, whereby those Particles were pretty well separated from each other, and, as it were, loos'd from the slimy Substance, yet each Particle remain'd entire. Amongst those separated Particles, I saw divers that had the Figure of a Pear; some of which, at the smaller end, were bent a little, others were roundish, but none of 'em had any part that answer'd the Stalk of a Pear.

Now since the said Particles were so link'd together, that they were hardly to be separated by boiling and stirring in the Water, I took divers of 'em out and divided them my self, and so likewise did I proceed with some of the said Matter just as I scrap'd it from my Tongue; and as often as I repeated these Experiments, which I did several days together, it always appear'd to me, that they were partly compos'd of little small Particles, which I one while believ'd to be little Scales of the outward Skin of the Tongue; but at another time I chang'd my Opinion of 'em, because they seem'd to me to be too small, and that they were mingl'd with an unspeakable number of small roundish Particles, about the same bigness as the Globules of the Blood which cause Redness, and that they seem'd to be divided each of 'em into six parts: Now tho' they were not of a reddish Colour, yet I imagin'd them to be small divided Blood Particles.

Now

Now when I had again observ'd with the greatest caution those Particles, which I had divided as well as I could from one another, and view'd them thro' one of my best Microscopes, I observed lying, and also floating in the liquid Substance, an unspeakable Number of long Particles, which were very bright and exceeding slender; some of them were much longer than others, and the longest of all agreed in length with the Hair of a Mans Beard, who had not been shaved in eight or ten days; some of them also appeared a little crooked.

Now whereas in my former Observations, I did not discover the aforesaid long Particles, it might perhaps proceed from hence, that I did not then so nicely attend unto it; for having now again looked over little of that Matter which I had scraped from my Tongue in my former Sickness, and which lay by me on a Glass, I judg'd that Matter likewise was composed of Particles.

I believe likewise, that in my endeavouring to separate those Particles from one another, I broke a great many of 'em to pieces.

I was likewise considering whether or no these long Particles might not be that Matter that is separated from the Blood, and which we call the Serum or Whey of the Blood; but if it be so, how can one conceive that such Matter should boil half an hour long in Water, and remain in the same several Days, without being dissolved or separated.

Some People, perhaps, might be ready to think, that hereafter bright Particles might be produced by some Medicine or other, that I had made use of, but that would be a mistake; for during my Fever, I did not take the least Physick, or indeed any thing else but a little Caudle, or a little Veal Broth with some Bread in it.

Now

Now since we perceive that that Matter, which is taken from the Tongue of a diseased Body, is not united but by the slimy Stuff, which is as it were peculiar to our Mouth; and that the said slimy Matter, is as it were dissolv'd by boiling Water; and that the Particles which are protruded out of the Tongue, lie in the Water separate from each other, and that several Days after that we have divided them, tho' it be into Particles no bigger than a Grain of Sand; we should judge that the whole Matter did in a manner only consist of long slender Particles, which I imagine had at first been much longer; but in the endeavouring to separate 'em, were broke into such short Pieces, as they now appear to me: which being so, we ought not to doubt, but that the said Matter is protruded out of the Tongue, and no evaporation or Coagulation from the Intraills.

In time of my Fever I had also a great Cough; inso-much that I was often apprehensive, that by the violence thereof I might break some of the Blood Vessels in the Lungs.

I spit some of the Phlegm, which with great Violence I had brought up, into a clean Pewter Pot, into which I had put a very little fair Water aforehand; and perceiving at the bottom of the said Pot, a longish Particle about the thickness of a Pin, but not quite so long, I took it out of the Water, and placed it before a Microscope, and judg'd it to be some coagulated Blood, tho' it was not of a red Colour; for I could see the Globules as plain as ever I discover'd them in the Blood; and one would at first have imagined them to be Blood Vessels with their Branches: but observing them more nicely, I discovered, that that Appearance was only occasioned by some of the Globules of Blood lying in their length something thicker upon the other.

Moreover I observed some brown cloudy Particles, floating very near the bottom of the Water, of which having taken out several, and view'd them by a Microscope, they appeared to my Eye to be mostly Blood Globules. After that that Matter, which I had taken from my Tongue, had lain above a Fortnight in the Water in which it was boyl'd, and that that Water was almost evaporated; I poured a little fresh Rain-water upon them, which had stood in a clean Bottle upon my Desk near the said boyl'd Water: and five or six days afterwards I took a thin slender Glass Tube, one of the Ends of which was open, and turn'd it hastily upside down into the bottom of the *China* Cup, in which most of the Particles which I scrap'd from my Tongue lay; with this design, that by the rushing in of the Water into the Tube, some of those Particles of the Tongue should be likewise carried upwards into the Glass Tube, and that by this means I might have a fresh Opportunity of viewing the said Particles; and it happen'd as I wish'd, and I discovered an unconceivable Number of exceeding small Animalcula, and those of different sorts; but the greatest Number of them were of one, and the same Size, but they were so little, that without a careful Observation, and a very good Microscope, they would have escap'd my Sight. Most of these Animalcula rendezvous'd in that part of the Water where the said Matter of my Tongue lay; which made me think whether those Animalcula might not receive their Nourishment from the aforementioned Particles: After these Animalcula had been about two hours in the Glass Tube, I perceived that a great many of 'em were dead.