1. 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. CINCE my last Observations concerning the Matter that was found upon the Tongues of Feverish Perfons; as also on the protuberant Parts on the Tongues of Oxen, Cows and Hogs, which I have communicated fome time fince 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 forafmuch 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 strong. ly united to the Particles of the Tongue, and viewd 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.

Took twice some of the aforesaid Matter off my Tongue, and put it into a clean China Cossee-dish, and pour'd upon it boyling Rain-water, and moreover caused 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 faid 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, loosed 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 fince the faid Particles were fo link'd together, that they were hardly to be separated by boiling and stiring in the Water, I took divers of 'em out and divided them my felf, and fo likewise did I proceed with some of the faid Matter just as I scraped it from my Tongue; and as often as I repeated these Experiments, which I did feveral 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 fame bigness as the Globules of the Blood which cause Redness, and that they seem'd to be divided each of eminto fix parts: Now tho' they were not of a reddiffe Colour, yet I imagin'd them to be small divided Blood Particles.

Now when I had again observed 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 Man's 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 diffolved 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 fince we perceive that that Matter, which is ta ken from the Tongue of a diseased Body, is not united but by the flimy Stuff, which is as it were peculiar to our Mouth; and that the faid flimy Matter, is as it were diffolv'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 feveral 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 confift of long flender Particles, which I imagine had at first been much longer; but in the endeavouring to separate 'em, were broke into fuch short Pieces, as they now appear to me: which being fo, we ought not to doubt, but that the faid Matter is protruded out of the Tongue, and no evaporation or Coagulation from the Intrails.

In time of my Fever I had also a great Cough; insomuch 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 sair Water asorehand; 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 feveral, 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 flood in a clean Bottle upon my Desk near the faid boil'd Water: and five or fix days afterwards I took a thin flender 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 faid Particles; and it happen'd as I wished, and I discovered an unconceivable Number of exceeding small Animalcula, and those of different forts; 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 faid Matter of my Tonguelay; 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.