

II. *A Letter to the Royal Society, from Mr. Anthony Van Leeuwenhoek, F. R. S. Concerning the Whiteness on the Tongue in Fevers, &c.*

Delft, Octob. 18. 1707.

I Have been long of Opinion, that our Tongue is of such a Form, that when it is found and of good Condition, it does not only communicate to the Body whatever is agreeable to it self, but also admits one part of the Matter that lies upon it, into the Manifold Vessels of which it is composed; insomuch that by the Veins it's communicated to the Heart, and serves for Nourishment to the Body, and strengthening of a well Constituted Tongue.

It so happened, that in the beginning of last September I was seized by a violent Fever, which however lasted but three days with me; upon the Fourth day I viewed my Tongue with a Magnifying Looking-Glass, and observed, that it was all over covered with Whiteness, only about a Fingers Breadth of the Tip was of its Natural Colour; this Whiteness is judged by most People to proceed out of the Stomach or Bowels, by the Swelling of the Guts, or else from a sharp Humour out of the Head.

Perceiving my Tongue thus all over White, I scraped off a little with a Penknife, and placed it before a Microscope, and presently judged, that those that call this White Matter in our Language *Beslagentheit*, and so publish it in their Books, are much mistaken, for that which truly bears that Name must be something from without, and not any Matter protruded from the Body.

Now

Now that this abovemention'd White Matter has no Analogy or Agreement with that which is coagulated upon the Tongue from without, but that it is certainly protruded out of the Tongue, appear'd to me very plainly, when I view'd it with my Microscope, for I could then observe, that it was not only closely united to the Tongue, but that it was also forced out of it, just as Plants proceed from the Earth; yea, that it extended it self into Boughs and Branches.

Now for the better understanding of the said protruded Matter from the Tongue, I plac'd some of it before a Microscope, and caus'd it to be painted, after having separated the Parts from one another, which I often found clung together.

*Tab. 2. Fig. 1.* A B C D E F represents one of the said small Parts which I had scraped from my Tongue; A B shews where it was fastned to my Tongue, and C F shews how the Body of it divided it self into two Branches, described by C D and F E.

I have observed several times in the aforesaid Trunk or Body of that Particle a long Fibre or Streak running perpendicularly thro' the middle of it, which I imagin'd to be a sort of a Vein or Vessel from which the whole Body or Branches received their Nourishment; but as soon as that White Matter becomes dry, one sees no more of those Fibres in it.

*Fig. 2.* G H I K L M N O P Q represents a second Particle, which I had taken from my Tongue, of which G H I Q is the Stalk or Root, and K L M N O P the six several Branches, all which were at G H united to, or rather riveted in the Tongue.

*Fig. 3.* R S T V W X was a third Particle protruded out of my Tongue, and at T X you see the place where it divided it self into two Branches, which Branches are divided by T V and X W; and the Painter having observed at V some further sproutings out, he has described

them according as they appeared to him, but I my self have observed such out Sproutings as look'd like Flowers ; and whereas my Fever had left me about a day or two before I scraped off that White Matter from my Tongue, I imagined that the extream parts of the afore-said Matter were almost worn or rubbed off when I made that Observation:

*Fig. 4.* Y Z A B C D was a fourth Particle of the protruded Matter from my Tongue, of which the greatest part of the Branches were, in a manner, worn or broken off, as you may see by A B C.

There was so much to be observed in all these Particles which I had scraped from my Tongue, that it was impossible for any Painter to describe them; they seem'd outwardly to be Convex, and withal as transparent as Chrystal; that is to say, at the very time I took them from my Tongue and view'd them with a Microscope; but when they were dry they did not appear so neat, which was occasion'd by the Slimy or Glutinous Matter which we have always in our Mouths, and which makes these Particles cleave together.

That I might free them from the afore-said Glutinous Matter or Spittle, I put them into a little Rain Water, and stir'd it gently about, to the end that the said Matter might be diluted and united to the Water; this being done I took some of those Particles, which by their weight had subsided to the bottom, and placed them before a Microscope.

I observed also with Wonder, how very strongly they were fastned to my Tongue when I scraped them from it, and that tho' I had let them lie eight days in Water, they were as strong as when they were first taken off.

Now how can we conceive the Common Opinion of some Doctors and Chymists, who maintain, that this Whiteness upon the Tongue is occasioned by the ascending

ing Vapours and Fumes from the Stomach ; whereas, as I imagine, that part of the Stomach which receives the Viſuals is always ſhut, except when it diſcharges it ſelf of Wind, which comes out by the Throat ; and how can the Fumes come out of the Head and deſcend upon the Tongue, as they alſo maintain, juſt as if our Heads were of the ſhape and make of the Helm or Head of a Still.

Might we not better reſolve it thus ; That our Tongues are ſo conſtituted, as to receive a few of thoſe Juices into the Orifices of its Veſſels, and that this cauſes the Senſation which we call Taſte, and that theſe Juices are carried or preſſ'd by the little Coats or Tunica's of the ſmall Veins that are in the Tongue, and ſo continued by the great Vein to the Heart ; but when we're indiſpoſed with a Fever, the Whitenefs which at that time appears upon the Tongue is occaſion'd by the Blood being ſo thick, that it can't be carry'd (as it ought to be) thro' the ſmall Veſſels, and by the Expulſion or driving back of that Moiſture in the Blood, which we call *Serum*.

Now the Tongue being thus cover'd with that White Matter that is protruded out of its Veſſels, is incapable of admitting any of its Juices into it, and this is the reaſon that at ſuch times we have little or no Taſte.

Moreover there lay about that Matter which has been deſcribed by *Fig. 1, 2, 3, 4*, a vaſt Number of little Scales, with which our Mouth is all cover'd over within ; and the Painter having obſerved two ſuch Scales that lay partly upon one another, he drew them, as you may ſee in *Fig. 5*, between A and B, and below them there lay another ſingle Scale, which is deſcribed by *Fig. 6. C D*.

Now ſince we obſerve ſo many of theſe little Scales to fall off of their own accord from the Mouth, may we not well conclude, that in a ſtrong Fever, ſuch Scales receive Nourishment.

We also observed, that a great many of these Scales had a round Bubble in the middle of them, and that there was seldom in one Scale two Bubbles, as in *Fig. 5.* in that Scale which is represented by B ; I thought with my self, whether this might not be the place from whence the Scales received their Nourishment.

*Fig. 6.* Does likewise represent a Scale between C and D with a round Bubble in it. You may remember I told you above, that I could observe none of this White Matter upon the Tip of my Tongue ; the Cause of which, perhaps was the great heat of the Liquor I then made use of ; for as soon as I found my self in a Fever, I ordered some Coffee to be made for me, and drank four Dishes of it as fast as I could one after the other, insomuch that my Lips were very sore with the heat of it the day after ; the drinking of this Coffee gave me great ease, and the next Morning I drank some *Bohea* Tea, as fast as ever I could, in order to put my self into a Sweat, but in vain ; now 'tis possible that the heat of the Coffee and the Tea had dissolved, or loosened the White Stuff upon the Tip of my Tongue, which is to be enquired into.

I have said before, that upon the fourth day of my Fever I first viewed my Tongue and the White Matter I scraped from it, which was the same Day my Fever left me ; and I imagine that about that time a great deal of the White Matter, that had been about my Tongue, was fallen off, and that had I viewed the same the second Day of my Fever, I should have seen that Matter and the Branches of it much more plainly.

In the Month of *October*, it was reported in my House, that there was a young Man so grievously troubled with the *Thrush*, that they were afraid it would have killed him, for he could scarcely draw his Breath ; having inform'd my self who was his Doctor, I sent to him and desired him to let me have a little of that Stuff which was taken from the Tongue of the Patient, which accordingly

cordingly was brought to me two Days after one another.

This Matter, which lay upon a Paper, stuck so fast together, that it was very difficult to separate it, and the most part of it appeared as clear as any Water to our naked Eye ; having view'd it thro' a Microscope, I saw that the clear sticking Moisture was encompass'd with an exceeding great number of very small Globules, which appeared to me to be much smaller than those that make our Blood Red ; and when this White Matter was thorough dry, it appeared to be of a Green Colour, much like that Matter which we discharge by the Mouth when we catch cold, and which is commonly called Green Phlegm.

The Doctor told me, that a Day or two before, there peeled off whole Skins from the Tongue of his Patient, whereupon I asked him, Whether his Tongue was not very much swell'd ? To which he answered, It filled the whole Mouth.

I observed moreover in the said Matter, whether I view'd it wet or dry, such a great number of small Fibres, just as if it had been a thin Membrane that I had placed before the Glass.

I said to the Doctor, how much those Persons were mistaken that affirm that these Skins upon the Tongues proceed from the Vapours or Fumes of the Stomach, in which the Doctor agreed with me ; but when I told him that the great thickness of the Tongue was occasioned by the want of the Blood circulating therein, whilst the Heart was continually sending up fresh Blood into the Tongue, by which means it was forc'd thro' the Tunica's of the Vessels, and turn'd to that Matter which was found upon the Tongue, and which we call the Trush ; and whereas that Matter which I found in my Illness upon my Tongue was nothing but the *Serum* of the Blood, the reason of that was, That the Protrusion of the Blood was not so strong

strong in me, as it was in the Young Man, neither were there any Globules to be observed in it; I say when I told the Doctor this, he seemed to differ from me at first, but afterwards he agreed with me entirely in this Opinion; to wit, that the Matter, which was found upon the Tongue, does not proceed from Fumes and Vapours out of the Stomach, but is protruded out of the Tongue; and added moreover, that when he scraped such like Matter from the Tongues of his Patients, in half an Hours time they were covered again with the Matter which we call the *Thrush*; and further, that when the Patient being something better had scraped off the Matter upon the Tip of the Tongue somewhat too harshly, he caused his Tongue to bleed, but soon after it had done Bleeding, 'twas again covered with the *Thrush*.

---

III. *Part of a Letter from Dr. Scipio des-Moulins, to Dr. Hans Sloane, R. S. Secr. concerning a Mineral Water at Canterbury.*

**A** Bout twelve Years ago a Mineral Water was accidentally detected in this City. In digging the Ground, they first met with a fat black Mold extending it self three Foot deep, and gradually changing into another sort of Earth, very fat and like Butter. This second Lay was two Foot thick; the Colour of it Yellow, something mixt; it's Odour strong and Mineral; and a piece of it, being for some time expos'd to the Sun, smell'd much like burning Sulphur. After this they found a Quicksand of a darker Colour than the first Earth, mix'd with several little Stones, and the Smell still stronger than before. Two Foot

Tab

Fig: 1:

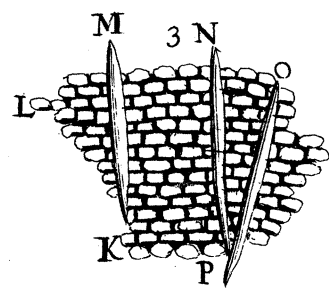
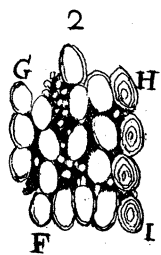
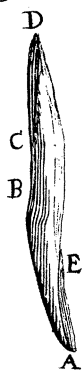
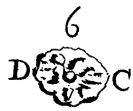
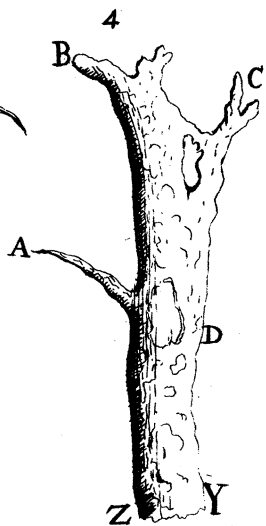
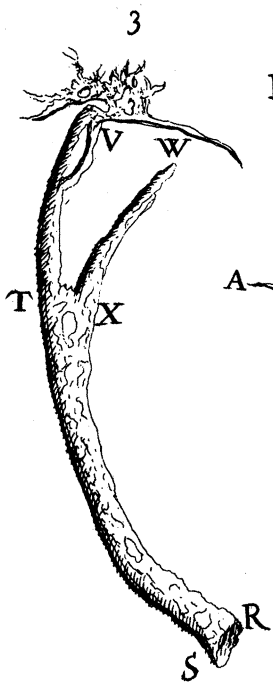
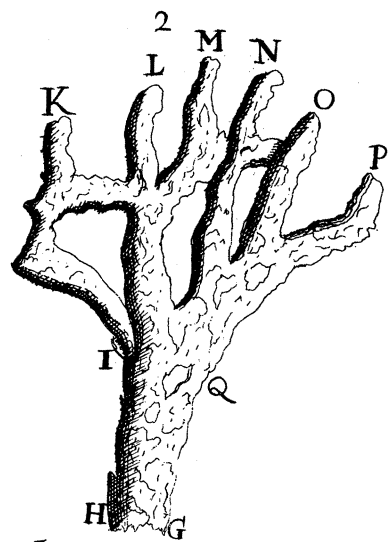
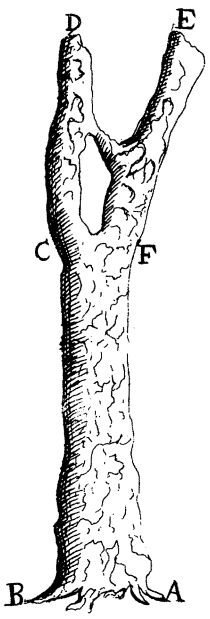


Fig: i:

Tab: 2:



Tab: 3.

Fig: 1:

