it drew up to the Day-pit, it caught one of the men along with it that was next the Eye, and up it comes with ſuch a terrible crack, not unlike, but more ſhrill than a Canon, that it was heard fifteen miles off along with the Wind, and ſuch a pillar of Smoke as darkened all the ſky over head for a good while: The brow of the Hill above the Pit was 18 yards high, and on it grew Trees 14 or 15 yards long, yet the mans Body and other things from the Pit were ſeen above the tops of the higheſt Trees at leaſt a hundred yards. On this Pit ſtood a Horſe-engin of ſubſtantial Timber, and ſtrong Iron-work, on which lay a trunk or barrel for winding the Rope up and down of above a thouſand pound weight, it was then in motion, one Bucket going down and the other coming up full of Water. This Trunk was faſtned to the frame with locks and bolts of Iron, yet it was thrown up and carried a good way from the Pit, and pieces of it, though bound with Iron-hoops and ſtrong Nails, blown into the Woods about; ſo likewiſe were the two Buckets, and the ends of the Rope after the Buckets were blown from them ſtood a while upright in the Air like pikes, and then came leiſurely drilling down: The whole frame of the Engin was ſtirr'd and moved out of its place, and thoſe Mens Clothes, Caps and Hats that eſcaped were afterwards found ſhattered to pieces, and thrown amongſt the Woods a great way from the Pit. This happened the third of *February* 1675, being a Seaſon when other Damps are ſcarce felt or heard of.

Mr. Leewenhoecks *Letter written to the Publiſher from* Delft *the* 14th *of* May 1677, *concerning the Obſervations by him made of the Carneous Fibres of a* Muſcle, *and the* Cortical *and Medullar part of the* Brain; *as alſo of* Moxa *and* Cotton.

SIR,

YOurs of the 22*th* of *February* mentions, that ſome of your Friends did wiſh, I would with all poſſible exactneſs obſerve the *Carneous* Fibres of a *Muſcle*, and alſo the *Cortical* and *Medullar* part of the *Brain*.

I acquainted you formerly in my Letter of the firſt of *June* 1674, that thoſe *Carneous* fibres of *Muſcles* did conſiſt of very ſmall globuls; yet for the further ſatisfaction of your Friends, I have laid aſide all my former Obſervations, to make quite new ones.

Among other, I took the fleſh of a *Cow*; this I cut aſunder with

with a ſharp Knife, and uſing a Microſcope I ſever'd before my eyes the membran from it; whereby I plainly ſaw that fine membran or film, in which theſe Carneous fibres lie interwoven, and of which I ſpeak in the above-mention'd Letter of the firſt of *June* 1674; where I ſay, that thoſe Membrans are made up of ſo many filaments or threds, as if with our naked Eye we ſaw the *omentum* of an Animal. Obſerving theſe Membrans more narrowly, I ſaw, that they do wholly and only conſiſt of ſmall threds running through one another; of which ſome, to my eye, appear'd to be 10, 20, and ſome 50 times thinner than a hair.

Having taken off the ſaid Membrans from the ſaid Carneous filaments, I ſaw very clearly theſe Carneous threds, which in this piece of fleſh were as thick as a hair on ones hand. Where they lay ſomewhat thick upon one another, they appear'd red; but the thinner they were ſpread, the clearer they ſhew'd.

I have uſed ſeveral methods of obſerving, to ſee the particles of theſe Carneous filaments, and have always found, that they are compoſed of ſuch parts, to which I can give no other figure than globular. Moreover, I have divided before my Eye into many ſmall parts very ſmall pieces of theſe Carneous filaments, which pieces were ſeveral times ſmaller than a grain of Sand; and I have obſerved beſides, that, when the fleſh is freſh and moiſt, and the globuls thereof are preſſed or rubbed, they diſſolve and run together, as if you ſaw an oily or thick wateriſh matter.

Theſe globuls, of which I ſay that the Carneous filaments do conſiſt, are ſo ſmall, that, if I may judge by my ſight, I muſt needs ſay, that ten hundred thouſand of them would not make one grain of gravel-Sand.

And having formerly written to you, that the particles, which do conſtitute fleſh, fat, bones, hair, &c. (which I call globuls) are not perfect globuls, but only come near ſuch; I ſhall now repeat ſomething of that matter: I deſire you to conſider only, that a great number of Sheeps-bladders, fill'd with water, and held in the Air, and every where ſurrounded by the ſame, are round, but if you throw them together into a Tun, they will loſe their roundeſs, and fall cloſe together, whereby each bladder will come to have its peculiar figure, they being very flexible; though the uppermoſt in the tun, as far as they are encompaſſed by

by the Air, will retain their globoſity. Thus it is with the globuls of the fleſh, which are very ſoft, as far as they are more or leſs ſurrounded by the Air.

Next, I have examined that membran of the Brain, which is call'd *pia mater*, and found, that this membran is permeated by very many little veins, beſides thoſe which with the naked eye we ſee upon the brain, eſpecially having firſt ſeparated the thin membran from the brain, under which I have ſeen ſmall veins of an admirable and incredible fineneſs, and, as far as I was able to diſcern, they conſiſt of exceeding thin filaments.

I have further obſerved, that the above-mention'd great number of veins, which run through the thin membran, diſſeminate their ramifications thorow the brain, after the manner as vines lying upon the earth ſhoot roots into the ground; imagining the Brain to be like the Earth, & the Veins like the Roots in the Earth.

Proceeding to the parts of the Brain it ſelf, I muſt ſtill ſay of them, eſpecially where they lie any thing thick upon one another, that they conſiſt of no other parts but globuls; but where the Brain lay ſpred very thin, cut thorough with a Knife, as if they had been ſeparated from one another, there they appeared like a very clear matter, as if it had been Oyl. Having view'd this matter, I imagined, it was thus cauſed by the knife, whereby the globuls of the brain had been broken: But continuing my Obſervations, not only of the Brains of beaſts, but alſo of fiſhes, and particularly of a Cod-fiſh, and repreſenting it very plainly to my eye, I ſaw, that the ſaid oleaginous matter had not been cauſed by the knife, but that indeed it was a matter by it ſelf, wherein the aforeſaid globuls lay. I ſaw moreover, but moſt plainly in the brain of a Cod-fiſh, that the ſaid oleous matter did indeed conſiſt alſo of yet much ſmaller globuls, than the other.

The former greater globuls of the brain, are, by my eſtimation, about the bigneſs of thoſe, which I formerly ſaid the Blood was made up of (which render the blood red.) Theſe greater globuls, which compoſe the Brain, are very irregular in reſpect of what thoſe of the Blood are: Whereof I conceive the cauſe to be this, that the globuls of the Brain lie cloſe to one another, or to the Veſſels, and being very ſoft do not ſeparate though they be ſhaken; whereas on the contrary, the ſanguine globuls are moved in a more fluid matter, and therefore, having elbow-room, keep their roundneſs.

I remember, that having heretofore obſerv'd the Brain of a *Duck*, I then judged, that they were cauſed only by the cloſe union, which the globuls (of which I then thought the whole Brain was made up) had to one another, and which did change into threds by a little ſtretching. But continuing my Obſervations for a'moſt a whole month together, I have ſeen plainly the very great number of exceeding ſmall veins running through the Brain; of which I could not at firſt aſſure my ſelf in the Brains of Beaſts, that they were indeed Veins, becauſe they are difficult to diſcern: But coming to obſerve the Brains of *Cod fiſh*, I very plainly ſaw thoſe many veſſels or veins, which were very clear, and withal very many throughout, diſſeminating themſelves by their ſmall branchings, and being 15 or 20 times finer than a ſingle thred of a Silkworm. Theſe ſmall veſſels or veins I have ſeen in great numbers in no greater quantity of the brain than might equal a grain of Sand: Beſides, I ſaw veſſels filled with blood or appearing red; as alſo veſſels that had the thickneſs of a ſingle thred of a Silk-worm, accompanied with great clearneſs.

Purſuing theſe my Obſervations about the Brains of Beaſts, I was able very plainly to repreſent to my ſelf the veſſels above diſcourſed of; and I could not without great admiration behold them, partly by reaſon of their great number, partly of their extraordinary ſubtlety; ſo that I muſt needs ſay, that if one blood-globul, I mean of thoſe that make the blood red, were divided into eight parts, and were of a ſtiff ſubſtance, it could not paſs any of theſe ſmall veſſels. And the oftner I repeated my obſervations, the plainer I could ſee thoſe manifold little veſſels with their ramuſcles, which were all very feeble, and by the leaſt touch broke aſunder.

Among the ſaid globuls, of which in part the Brain conſiſts, I have ſeen Blood-globuls, which may very plainly be diſcern'd from the Brain-globuls, eſpecially by the perfect roundneſs which the blood-globuls had. Theſe blood-globuls, I imagined, came out of the ſanguineous veſſels, which run through the Brain, and had been cut in pieces by the Knife.

Between the *Cortical* and *Medullar* part of the Brain I can ſee little or no difference, eſpecially when I repreſent them before me very thin: Only this I noted, that the little veins or veſſels which ran through the *Cortex*, were of a dark and brown

colour

colour, whereas thoſe in the *Medulla* were clearer and more tranſparent.

I have ſeen in the Brain, and moſt in the Cortical part, ſuch Small ſanguineous veſſels being red (which came out of bigger ones) that I cannot comprehend, how the globuls could paſs through them; and, (what is more,) when you ſee the Blood-globuls ſingle, they have little or no colour, whereas on the contrary the blood in theſe ſmall veins was yet red: Yea, the red colour penetrated through the veins, and coloured the neighbouring parts of the brain red. But reflecting on my former obſervations about *Lice*, I there ſaw divers times, that when I made a Louſe hungry, and then ſet her on to ſuck blood, ſhe could not diſpoſe of, nor digeſt, all the blood; whence it came to paſs, that the blood-globuls, which rendred it red, came to diſſolve in the fluid matter, and ſo changed the blood into a more fluid matter; and this blood came to diffuſe it ſelf through the whole body of the Louſe, and through the very feet and horns, and to colour them red. The cauſe, why the blood was not conſumed in the Louſe, I imagined to be, becauſe the guts, or ſmall veins in the Louſe, had been for want of food dried up, whence the ſame was hindred from its due motion, nor could be duly conveyed through the body. Yet this change of blood (I very well remember) hath at other times been obſerved by me, when the blood had ſtood a while in a Glaſs. And thus it may be or become red in the ſmall veins of the Brain, though they be ſo ſlender, that no globuls, keeping their roundneſs, can paſs through them.

I have alſo obſerv'd the *Spinal marrow* of a Calf, Pullet, Sheep, and Cod-fiſh; which I have found to conſiſt of no other parts than thoſe of the Brain; yet with this difference, that, beſides the related globuls in the Brain, there lay in the Spinal marrow a great number of ſhining oleaginous globuls, of divers bigneſſes, ſome of them 50 times bigger than others; and thoſe alſo very ſoft and fluid. Theſe ſpinal marrows were alſo furniſhed with exceeding thin and manifold ſmall veins or veſſels; and beſides theſe very ſmall veins, there ran up and down along theſe ſpinal marrows brown filaments, of the thickneſs of the hair of ones head, and thinner. Theſe being ſeen by me, I imagined firſt, whether ſuch filament might not be a vein; but having further with great attention inquired into it, I perceived, that each fi-

lament was not one ſingle veſſel by it ſelf, but that each of them conſiſted of divers very ſmall threds or veſſels, lying by one another, between which threds there lay very clear veſſels of the fineneſs of a ſingle Silk-worm-thred. Here I had thoughts, whether theſe veſſels might not be thoſe, that conveyed the animal ſpirits through the Spinal marrow.

A while ſince, being at the houſe of Monſieur *Conſtantin Huygens de Zulichem*, he did me the favour to ſhew me ſome of that *Moxa*, which by burning it upon any gouty part removeth the Gout. Of this ſtuff I took ſome along with me, and (out of curioſity only) burnt ſome of it upon the back of my hand according to the preſcript of the Book publiſhed concerning it, the better to know if there were any peculiarity in its burning. Which done I found, that upon the skin where the burning was made, there lay a yellow oily matter, which I thought at firſt had been cauſed only by the burning of the skin. This burning I gave over, not by reaſon of the pain, but of its ſlow healing; and if I had not found more trouble in it, than in the cut of my hand made with a Knife, (which I am wont to ſow up, and then count it healed) I ſhould have repeated the burning ſeveral times. I have more than once examined this *Moxa* by my Microſcope, and do not find it to be ſuch a curious preparation of an excellent dryed herb; but that 'tis only ſome lanuginous expiration or protruſion of a fruit, ſuch as is the *lanugo* ſeen upon a Peach, Quince, or the like; and I was of opinion, that I might have gather'd very near the like ſubſtance from ſome herbs; but that I have hitherto failed of.

This *Moxa* agrees in ſhape with Cotton: For, as there is no other difference between *Hair* and *Wool*, than that Hair is courſer and longer than Wool, both being made up of globuls, and they being clear about the rounder end; ſo little difference is there between the *Moxa* and *Cotton*, for they have both two flat ſides. Such a ſhape hath alſo the roughneſs, that is found lying within againſt the red bark of a Cheſtnut; only with this difference, that that of *Moxa* is much thinner than that of *Cotton*, and that of *Cotton* thinner than of the *Cheſnut*. I have put ſome of the *Moxa* (becauſe I would not be troubled with the burning of it upon my skin) on fine poſt-paper, and ſome *Cotton* likewiſe, after I had ſomewhat cut it aſunder with Sciſſers, that ſo, by its being ſhorter, the fire might the better paſs from one part to the

the other. The burnings cauſed on the paper by both, were very near alike; and I concluded thereupon, that if the burning had any effect in the gout, it proceeded not from any peculiar quality in the *Moxa*, but only from the burning it ſelf, and that if the burning were made with *Cotton*, it would produce as good effects as if made with *Moxa*.

I have taken very near the ſame quantity of *Moxa*, *Cotton*, and the matter which lies within a *Cheſnut* againſt the red outer skin thereof, and burnt them together one by the other, and I have ſeen, that they all three, after burning, left behind them an oleous matter; but the *Moxa* moſt: Which may proceed from hence, that though there ſeemed to be the ſame quantity of all, yet the *Moxa* held more, it being finer than *Cotton*, and therefore lying cloſer together, and conſequently yielding more oyl. Whence it appears, that Mr. *Buſſchoff* had not ſo good reaſon to extol the *Moxa* and its preparation above *Cotton* or other the like ſubſtances.

Having conſider'd the ſaying of Chirurgions, that *Cotton* is fiery and malignant if any wound be dreſſed therewith; I have found, that that fierineſs or malignity conſiſts in this, that *Cotton* hath two flat ſides, (as was ſaid above) and conſequently every part of it hath two ſharp ſides, which being thinner than globuls, that make up the Carneous filaments, and being alſo ſtiffer than the globular fleſh, it comes to paſs, that *Cotton* being laid upon a wound, not only the globuls of the yet ſound fleſh are annoyed by the ſharp ſides of it, but alſo the new matter which is conveyed to make new fleſh, and is yet ſofter than the fleſh already made, is the more eaſily cut aſunder and diſſolved; whereas on the contrary, linnen-rags, having roundiſh parts and many of them lying firm together, and ſo making up a greater body, are not capable to wound the globular parts of the fleſh.

The Deſcription of a Celeſtial Globe, artificially made, ſhewing the Apparent Motions, from Eaſt to Weſt, and from Weſt to Eaſt, of the Sun, Moon, and Fixed Stars: Made by Monſieur Didier L'Alleman, *Maſter Watchmaker at* Paris, *and communicated to the Publiſher in French, and here by the ſame made Engliſh.*

THis Globe hath been made conform to the Obſervations of the moſt famous Aſtronomers of this Age, and directed by Monſieur *Antonine Agarrat*, Profeſſor of the Mathematicks at *Paris*.